RF2617

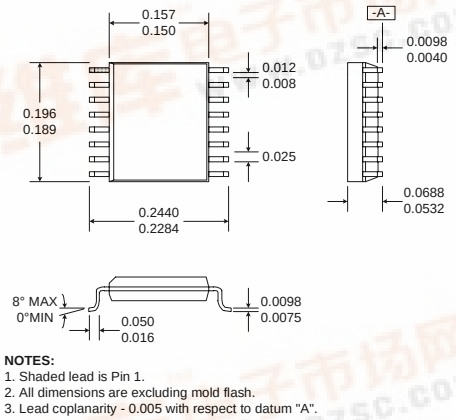
3V CDMA/FM RECEIVE AGC AMPLIFIER

Typical Applications

- 3V 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 RF2617 is a complete AGC amplifier designed for the receive section of 3V 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 Chip Set, 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.

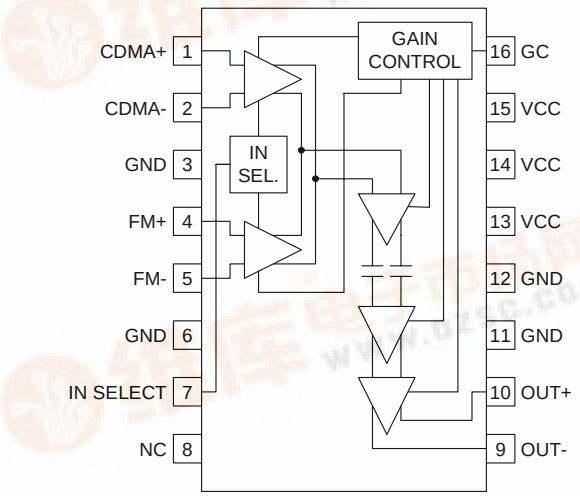


NOTES:
1. Shaded lead is Pin 1.
2. All dimensions are excluding mold flash.
3. Lead coplanarity - 0.005 with respect to datum "A".

Package Style: SSOP-16

Optimum Technology Matching® Applied

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



Functional Block Diagram

Features

- Supports Dual Mode Operation
- -48dB to +48dB Gain Control Range
- Single 3V Power Supply
- Digitally Selectable Inputs
- -2dBm Input IP_3
- 12MHz to 285MHz Operation

Ordering Information

RF2617	3V CDMA/FM Receive AGC Amplifier
RF2617 PCBA	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
7625 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

RF2617

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.

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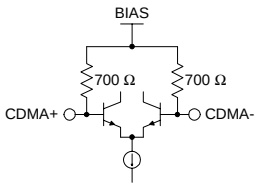
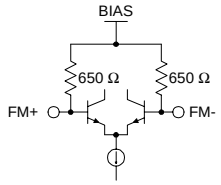
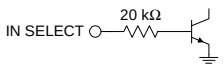
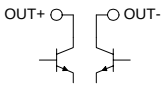
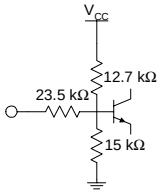
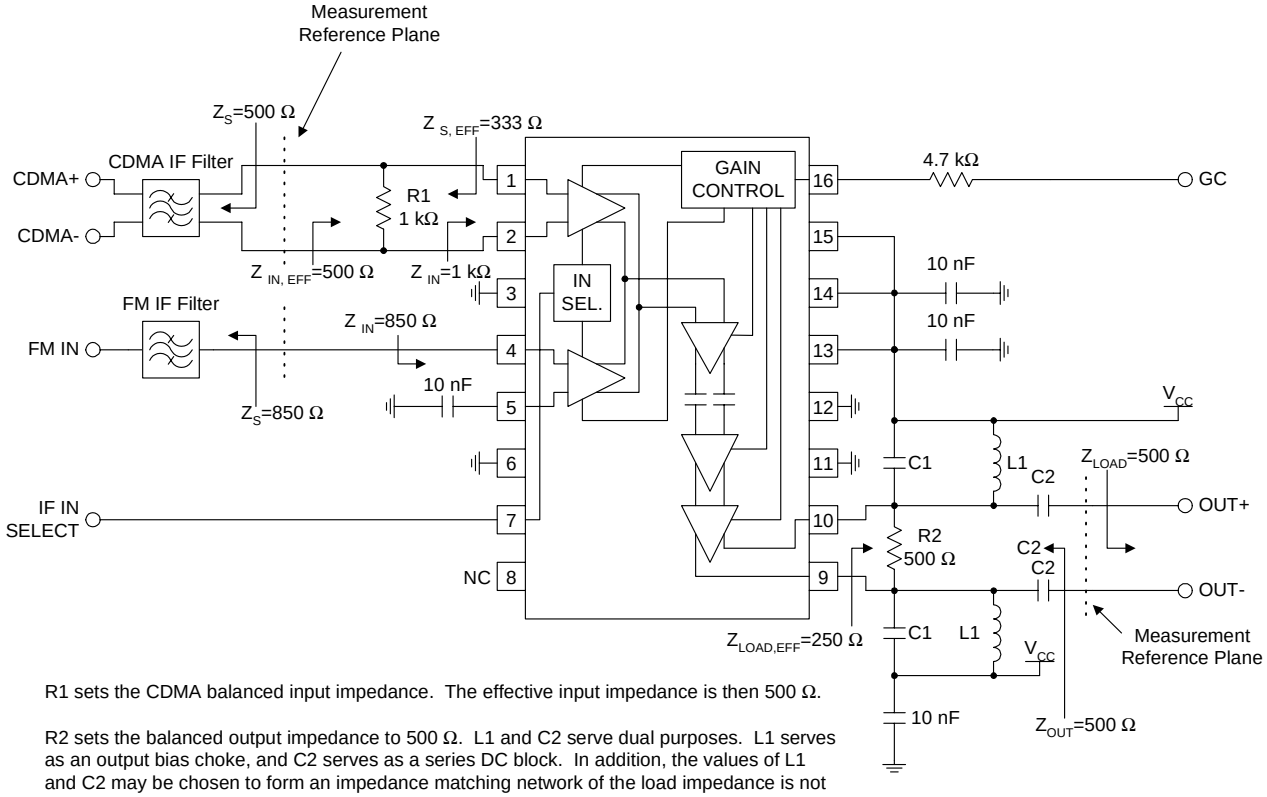
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=25°C, 85MHz, V_{CC}=3.0V, Z_S =500Ω, Z_L=500Ω, 500Ω External CDMA Input Terminating Resistor, 500Ω External Output Terminating Resistor (Effective Z_S=333Ω, Effective Z_L=250Ω) (See application schematic).
Frequency Range		12 to 285		MHz	
CDMA Maximum Gain	+45	+48		dB	V_{GC}=2.4V
CDMA Minimum Gain		-48	-45	dB	V_{GC}=0.3V
FM Maximum Gain	+45	+49		dB	V_{GC}=2.4V
FM Minimum Gain		-48	-45	dB	V_{GC}=0.3V
Gain Slope		57		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	8	dB	At maximum gain and 85MHz
Input IP_3	-44	-40		dBm	At +40dB gain, referenced to 500Ω
	-4	-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		2.7 to 3.3		V	
Current Consumption		13	15	mA	Minimum gain, V_{CC}=3.0V
Current Consumption		14	16	mA	Maximum gain, V_{CC}=3.0V

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

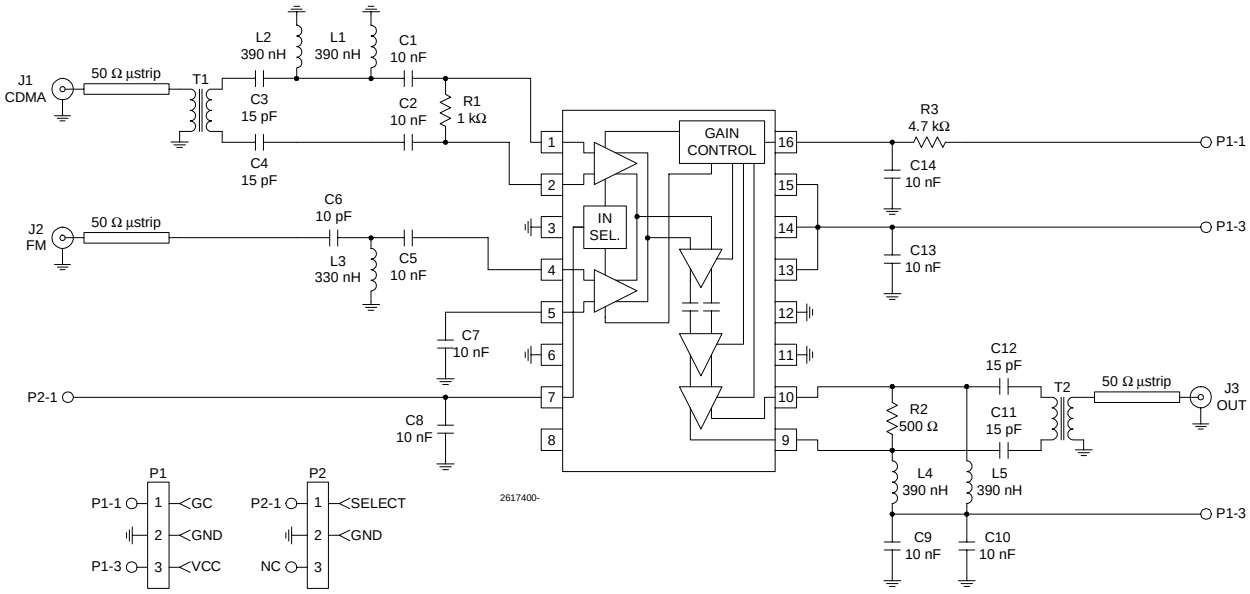


R1 sets the CDMA balanced input impedance. The effective input impedance is then 500 Ω.

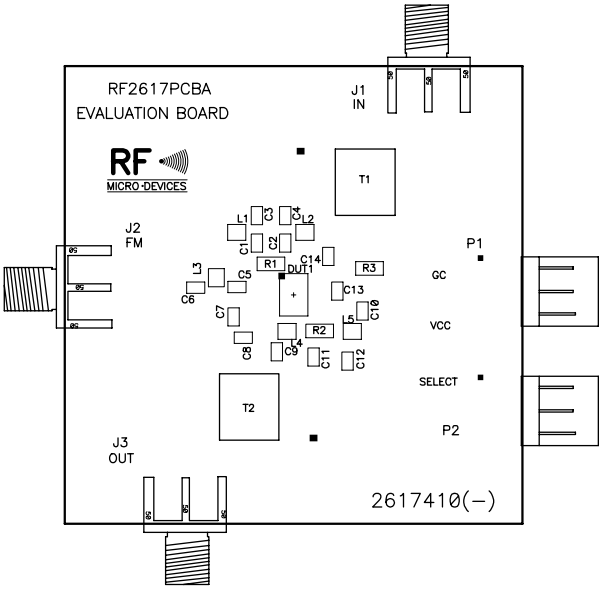
R2 sets the balanced output impedance to 500 Ω. L1 and C2 serve dual purposes. L1 serves as an output bias choke, and C2 serves as a series DC block. In addition, the values of L1 and C2 may be chosen to form an impedance matching network of the load impedance is not 500 Ω. Otherwise, the values of L1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

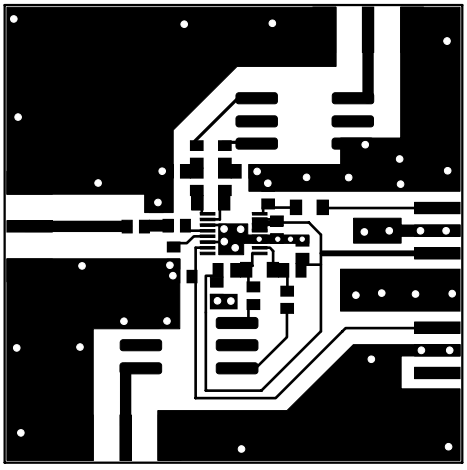
Evaluation Board Schematic

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

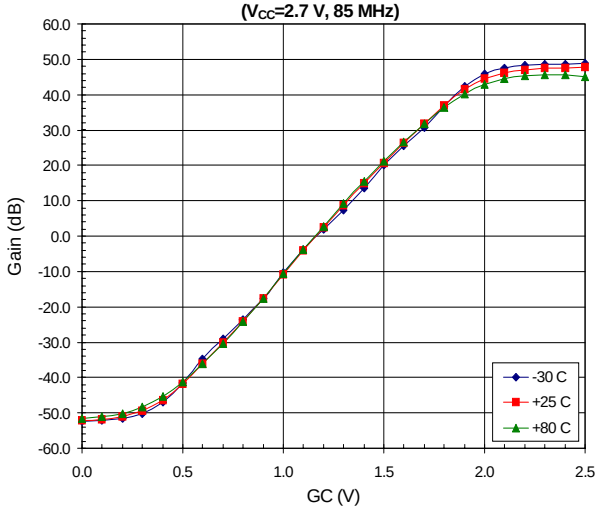


Evaluation Board Layout

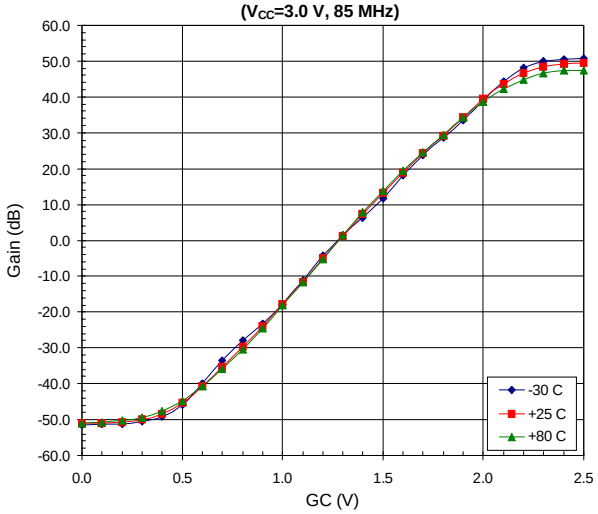




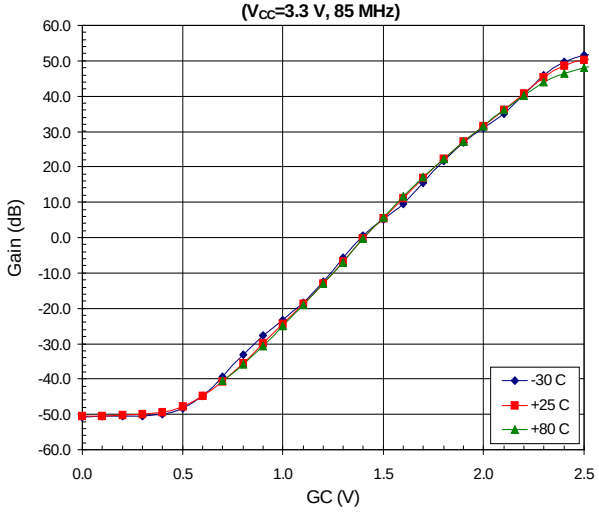
Gain versus Gain Control Voltage
(V_{CC}=2.7 V, 85 MHz)



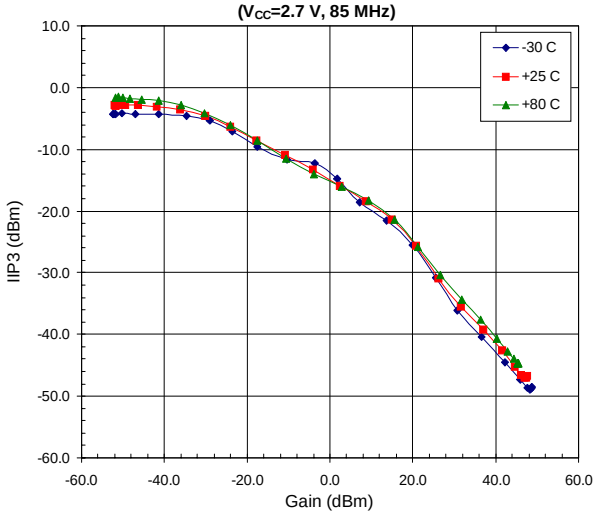
Gain versus Gain Control Voltage
(V_{CC}=3.0 V, 85 MHz)



Gain versus Gain Control Voltage
(V_{CC}=3.3 V, 85 MHz)



Input IP3 versus Gain
(V_{CC}=2.7 V, 85 MHz)



Input IP3 versus Gain
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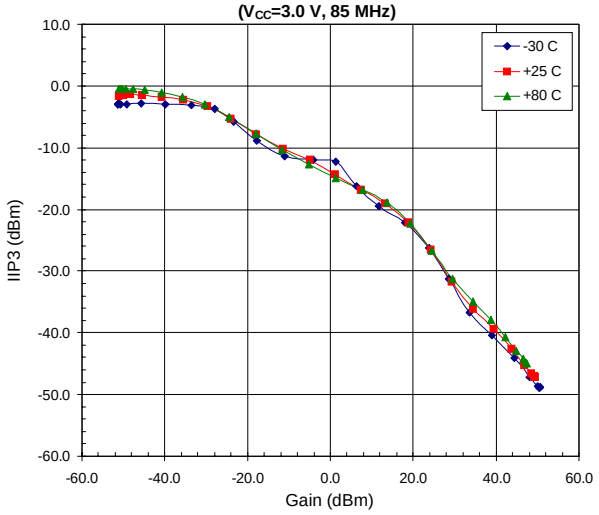
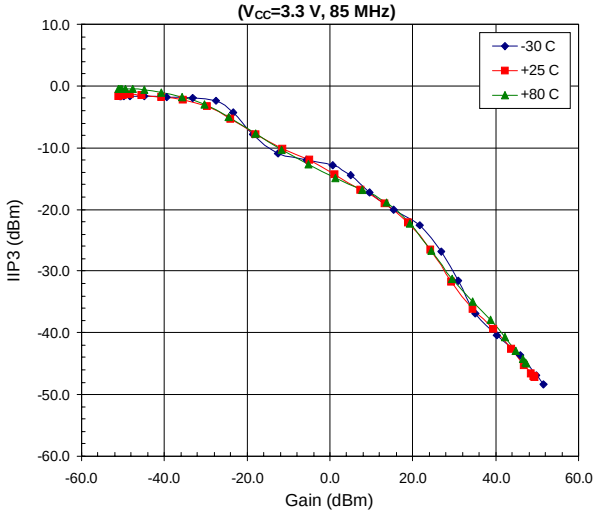
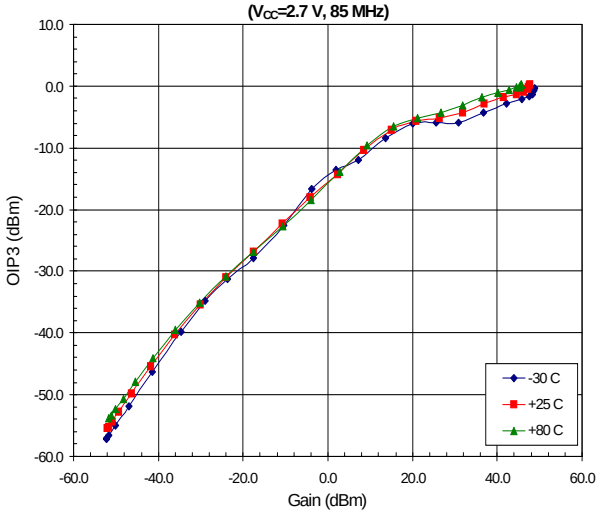


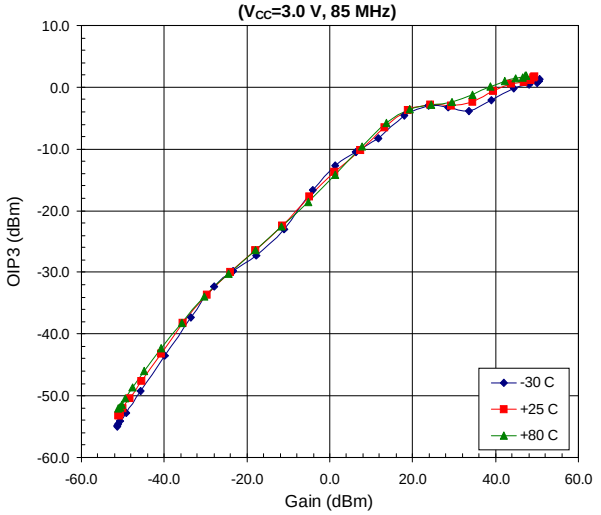
Input IP3 versus Gain
(V_{CC}=3.3 V, 85 MHz)



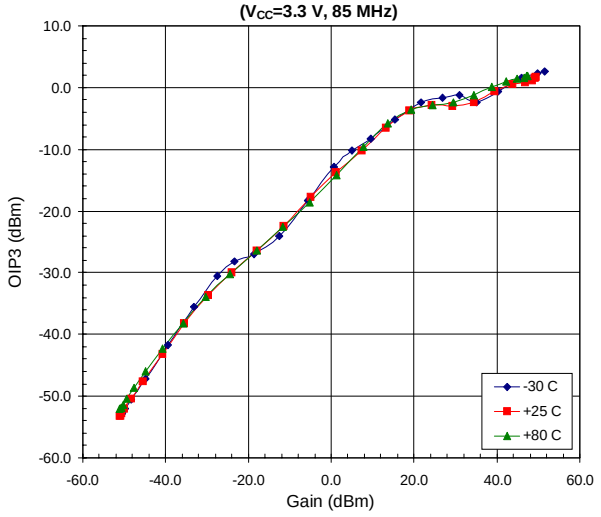
Output IP3 versus Gain
(V_{CC}=2.7 V, 85 MHz)



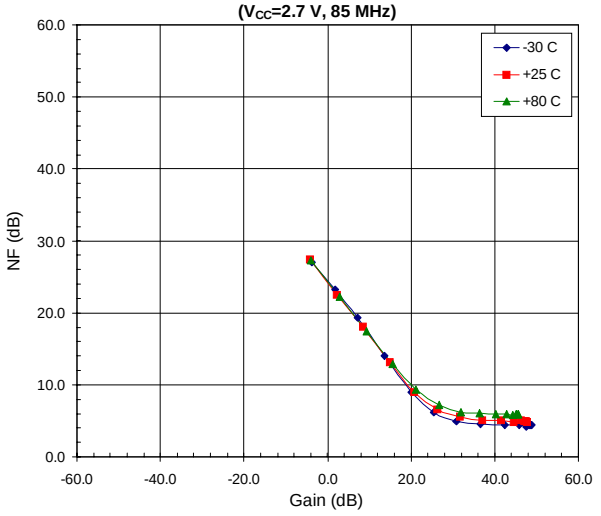
Output IP3 versus Gain
(V_{CC}=3.0 V, 85 MHz)



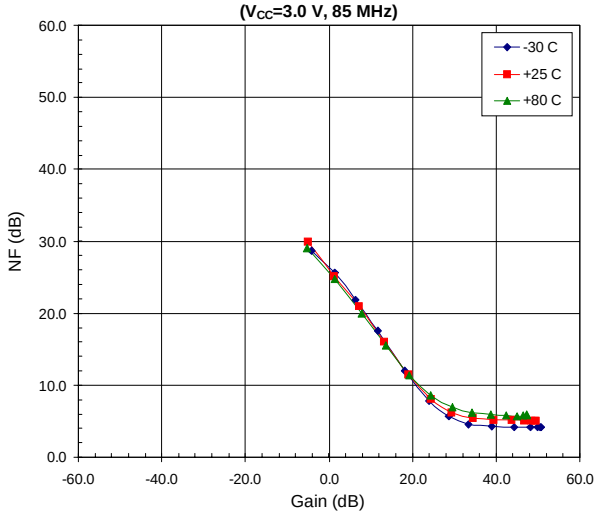
Output IP3 versus Gain
(V_{CC}=3.3 V, 85 MHz)



Noise Figure versus Gain
(V_{CC}=2.7 V, 85 MHz)



Noise Figure versus Gain
(V_{CC}=3.0 V, 85 MHz)



Noise Figure versus Gain
(V_{CC}=3.3 V, 85 MHz)