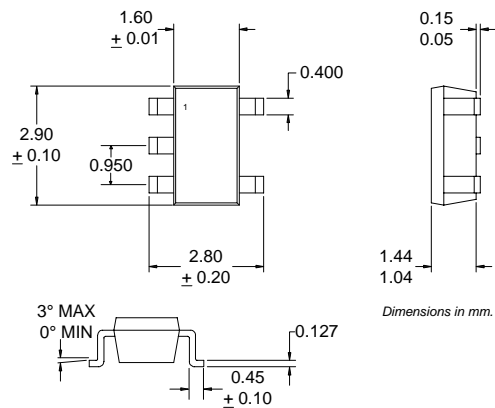


Typical Applications

- DCS GSM
- PCS CDMA
- PCS TDMA
- 2.4GHz Systems
- General Purpose Amplification
- Commercial and Consumer Systems

Product Description

The RF2365 is a low noise amplifier with a high dynamic range designed for the receive front end of digital cellular applications at PCS/DCS frequencies. It is designed to amplify low level signals with minimum noise contribution while operating in the harsh, interference-rich environments of newly deployed digital subscriber units. The part provides excellent performance as a LNA for 2.4GHz radio applications. The IC is featured in a standard SOT5-lead plastic package.

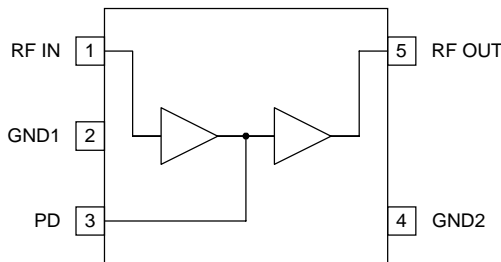


**4**  
GENERAL PURPOSE  
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Optimum Technology Matching® Applied

- |                                     |  |                                      |
|-------------------------------------|--|--------------------------------------|
| <input type="checkbox"/> Si BJT     | <input checked="" type="checkbox"/> GaAs HBT | <input type="checkbox"/> GaAs MESFET |
| <input type="checkbox"/> Si Bi-CMOS | <input type="checkbox"/> SiGe HBT            | <input type="checkbox"/> Si CMOS     |

Package Style: SOT 5-Lead



Functional Block Diagram

Features

- 1.6dB Noise Figure @ 1850MHz
- 1.75dB Noise Figure @ 2450MHz
- 18.0dB Gain at PCS/DCS
- 15.5dB Gain at 2.45GHz
- External Bias Control
- Extremely Small SOT23-5 Package

Ordering Information

- |             |                                  |
|-------------|----------------------------------|
| RF2365      | 3V Low Noise Amplifier           |
| RF2365 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>

# RF2365

## Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +8.0	V <sub>DC</sub>
Input RF Level	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



Caution! ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

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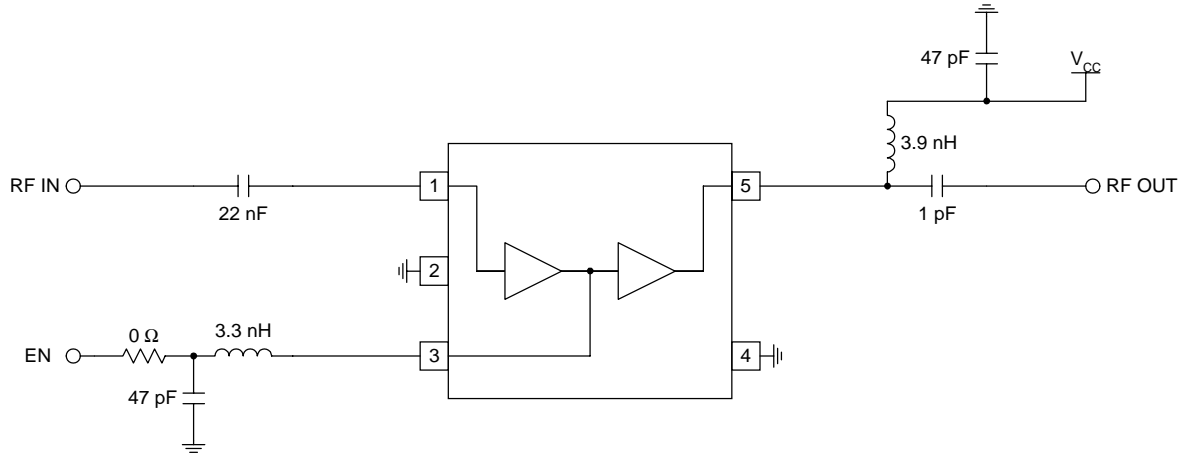
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					
RF Frequency Range	1500		2500	MHz	
<b>PCS Performance</b>					Schematic per 1.9GHz LNA Application Schematic, V <sub>PD</sub> = 3.0 V <sub>CC</sub> = 3.0V, T=25°C
Gain	16	18	20	dB	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =8.0mA
Noise Figure		1.6		dB	
Off Mode Gain		-15		dB	V <sub>CC</sub> =3.0V, V <sub>PD</sub> =0
S <sub>12</sub>		25		dB	
Input IP3		-3.5		dBm	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =5.0mA, R <sub>1</sub> =150Ω (see application schematic)
		+2.0		dBm	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =6.5mA, R <sub>1</sub> =75Ω (see application schematic)
		+4.0		dBm	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =8.0mA, R <sub>1</sub> =0Ω (see application schematic)
Output IP3	20.0	22.0	28.0	dBm	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =8.0mA, R <sub>1</sub> =0Ω (see application schematic)
Input VSWR		1.7			
Output VSWR		1.4			
<b>2.4GHz Performance</b>					Schematic per 2.4GHz LNA Application Schematic T=25°C
Gain		15.5		dB	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =8.0mA
Noise Figure		1.75		dB	
Input IP3		+2.0		dBm	V <sub>CC</sub> =3.0V, I <sub>CC</sub> =8.0mA
Input VSWR		1.3			
Output VSWR		1.75			
<b>Power Supply</b>					T = 25 °C
Voltage (V <sub>CC</sub> )		3		V	
Current Consumption	5.0	8.0	11.0	mA	V <sub>CC</sub> =3.0V, IIP3=+4.0dBm
		6.5		mA	V <sub>CC</sub> =3.0V, IIP3=+2.0dBm
		5.0		mA	V <sub>CC</sub> =3.0V, IIP3=-3.5dBm
Power Down	0		1	μA	V <sub>CC</sub> =3.0V; V <sub>PD</sub> ≤0.9V

Pin	Function	Description	Interface Schematic
1	RF IN	RF input pin. This pin is DC coupled.	
2	GND1	Ground connection. See evaluation board schematic notes.	
3	PD	Power down pin. This pin serves as the interstage for the 2-stage LNA. An inductor is required to pull pin 3 to $V_{CC}$ (see application schematic). If desired, this voltage can be lowered to trade off IP3 versus $I_{CC,TOTAL}$ . (See table below.)	
4	GND2	Ground connection. See evaluation board schematic notes.	
5	RF OUT	Amplifier Output pin. This pin is an open-collector output. It must be biased to either $V_{CC}$ or pin 4 through a choke or matching inductor. This pin is typically matched to $50\Omega$ with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	

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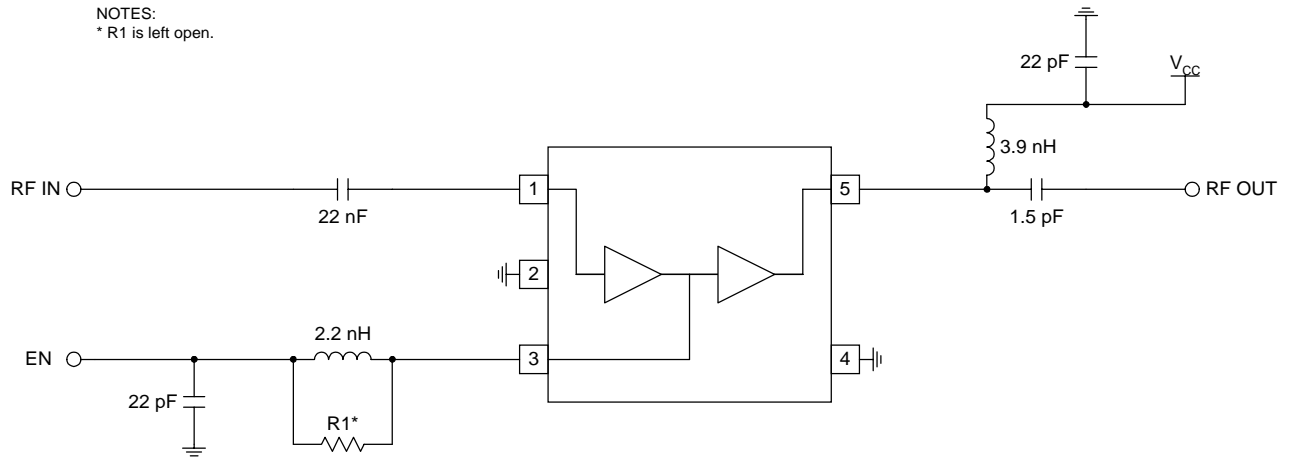
R1	IIP3	$I_{CC}$
$0\Omega$	+4.0dBm	8.0mA
$75\Omega$	+2.0dBm	6.5mA
$150\Omega$	-3.5dBm	5.0mA

## Application Schematic - 1.9GHz



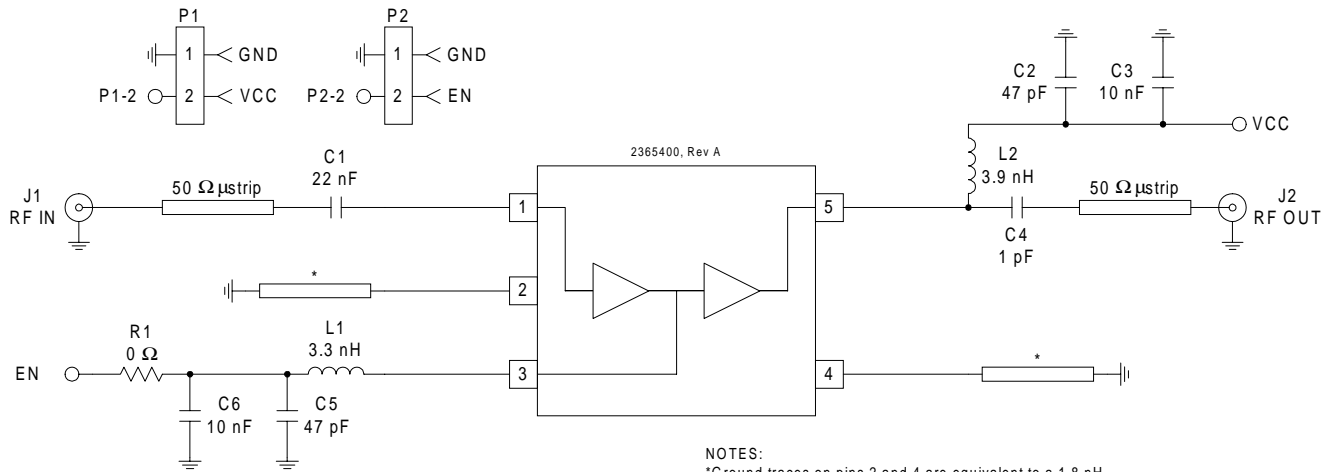
## Application Schematic - 2.4GHz

NOTES:  
\* R1 is left open.



## Evaluation Board Schematic - 1.9GHz

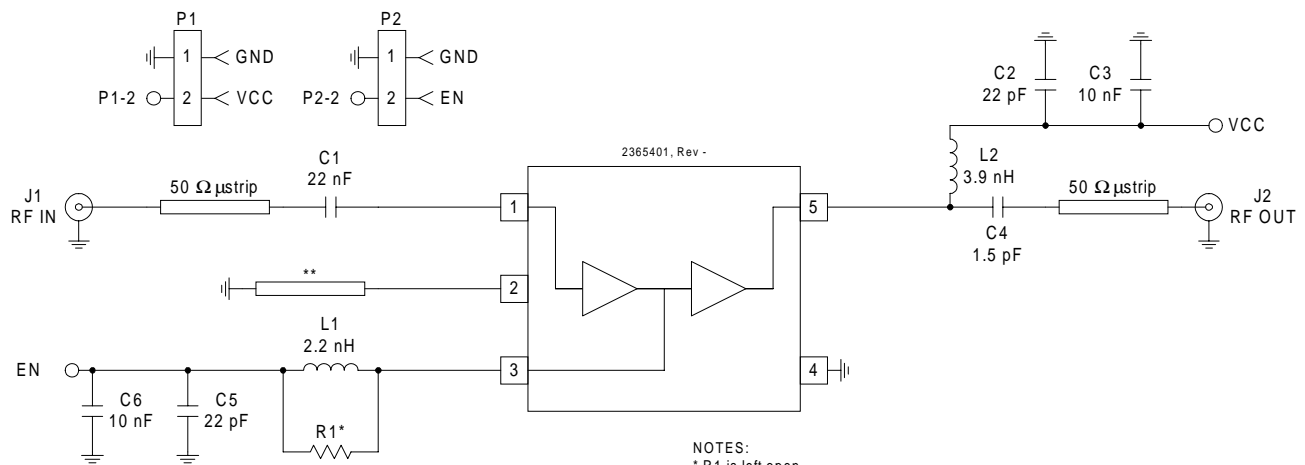
(Download [Bill of Materials](http://www.rfmd.com) from [www.rfmd.com](http://www.rfmd.com).)



NOTES:  
 \*Ground traces on pins 2 and 4 are equivalent to a 1.8 nH inductor. If an inductor is not used, the dimensions are as follows:  
 Length = 140 mils  
 Width = 20 mils  
 Height = 31 mils from the ground plane. Dielectric is FR-4.

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## Evaluation Board Schematic - 2.4GHz

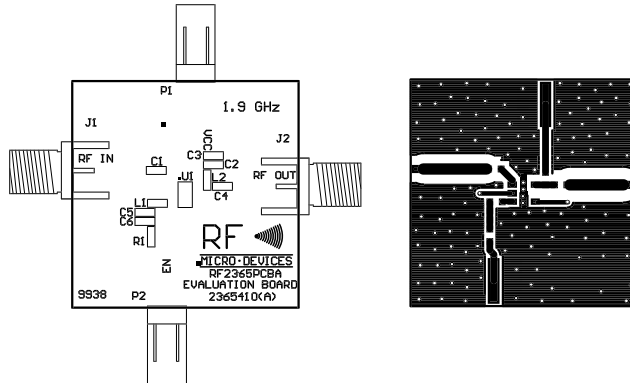


NOTES:  
 \* R1 is left open.  
 \*\*Ground trace on pin 2 is equivalent to a 1.0 nH inductor. If an inductor is not used, the dimensions are as follows:  
 Length = 85 mils  
 Width = 20 mils  
 Height = 31 mils from the ground plane. Dielectric is FR-4.

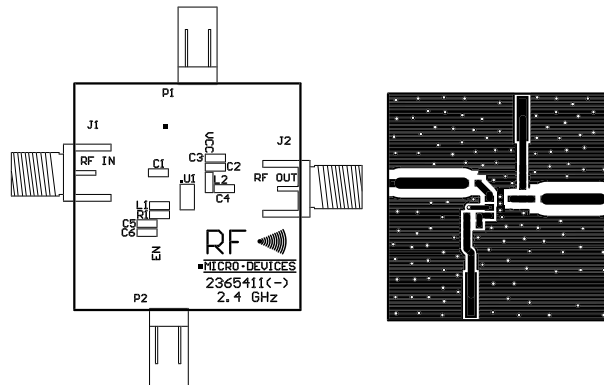
# RF2365

## Evaluation Board Layout Board Size 1" x 1" 1.9GHz

Board Thickness 0.031"; Board Material FR-4



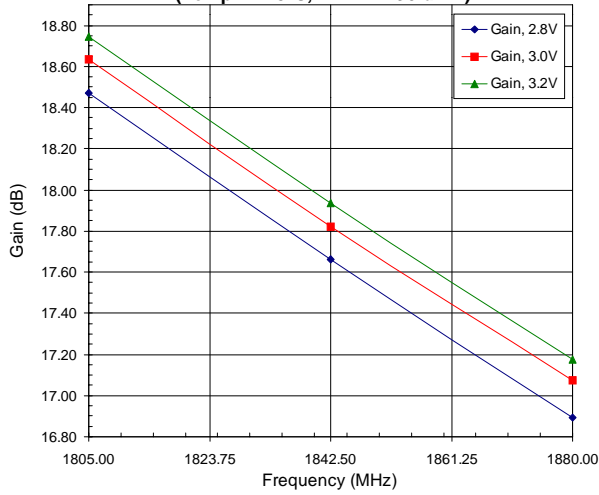
## 2.4GHz



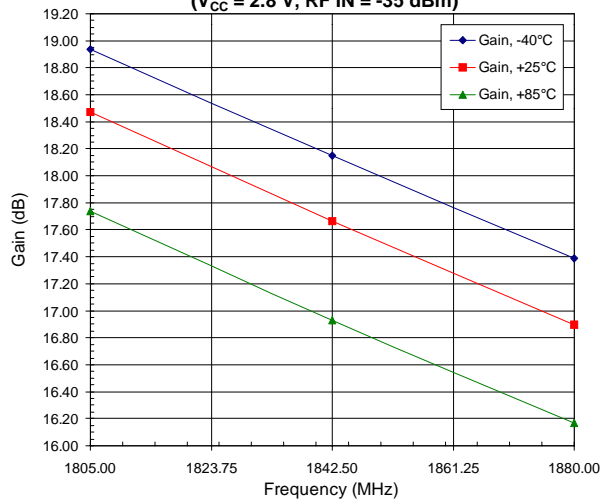
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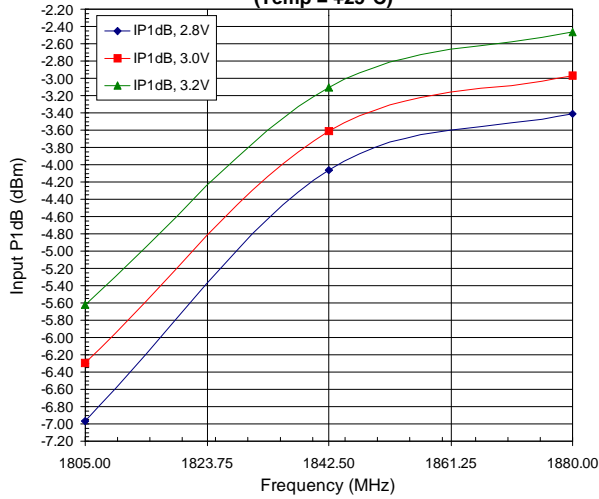
**Gain versus Frequency and  $V_{CC}$**   
(Temp = +25°C, RF IN = -36 dBm)



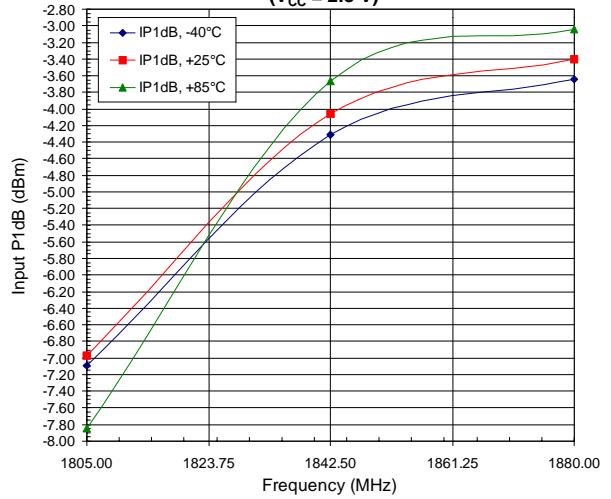
**Gain versus Frequency and Temp**  
( $V_{CC} = 2.8$  V, RF IN = -35 dBm)



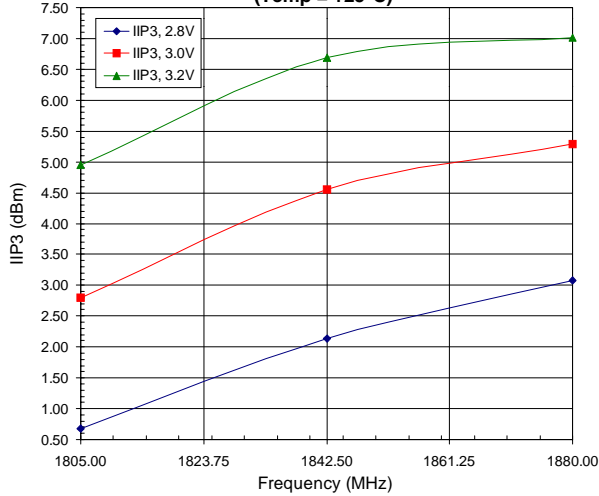
**Input P1dB versus Frequency and  $V_{CC}$**   
(Temp = +25°C)



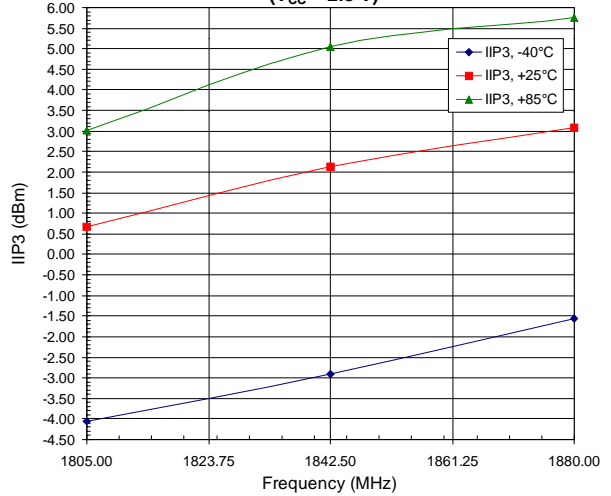
**Input P1dB versus Frequency and Temp**  
( $V_{CC} = 2.8$  V)



**IIP3 versus Frequency and  $V_{CC}$**   
(Temp = +25°C)

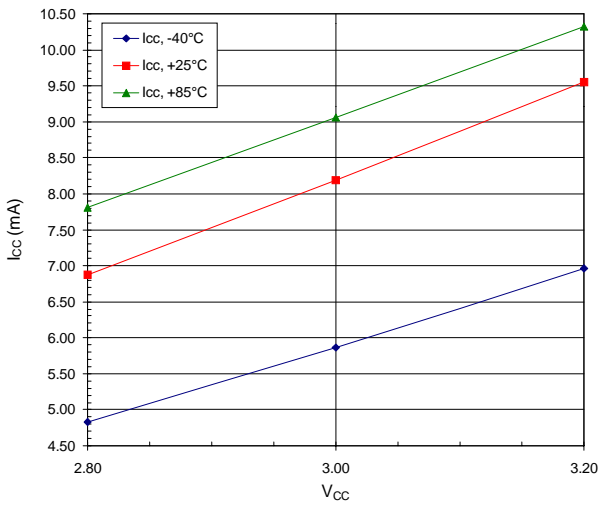


**IIP3 versus Frequency and Temp**  
( $V_{CC} = 2.8$  V)

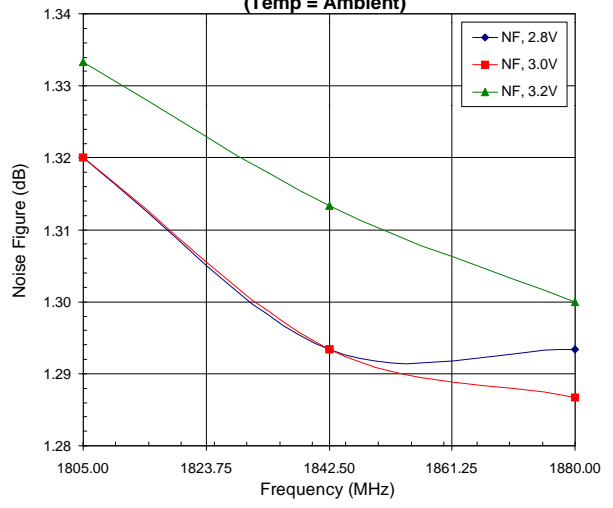


# RF2365

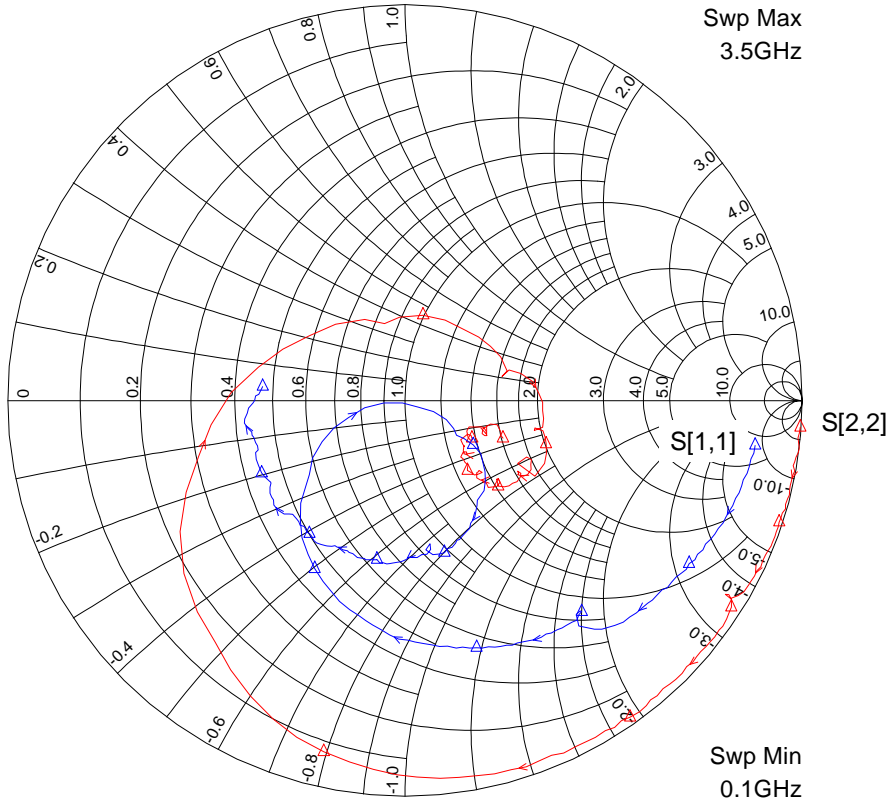
**I<sub>CC</sub> versus V<sub>CC</sub> and Temp**



**Noise Figure versus Frequency and V<sub>CC</sub>  
(Temp = Ambient)**



**Input/Output Impedance @ 2.8 V**



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