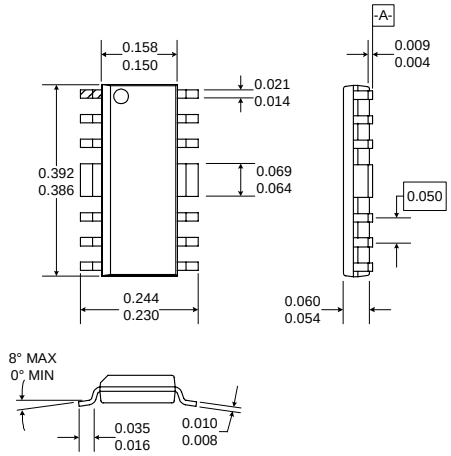
Typical Applications

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

Product Description

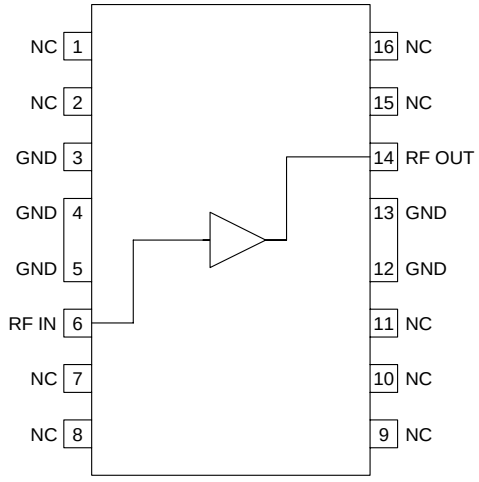
The RF2320 is a general purpose, low-cost, high-linearity RF amplifier IC. The device is manufactured on a Gallium Arsenide process and is featured in an SOP-16 batwing package. It has been designed for use as an easily cascadable 75Ω gain block with a noise figure of less than 2dB. Gain flatness better 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 2500MHz. The device is self-contained with 75Ω input and output impedances providing 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
- ☐ GaAs HBT
- ☐ SiGe HBT
- ☑ GaAs MESFET
- ☐ Si CMOS



Functional Block Diagram

Features

- 5MHz to 2500MHz Operation
- Internally Matched Input and Output
- 16dB Small Signal Gain
- 1.6dB Noise Figure
- +22dBm Output Power
- Single 6V to 9V Positive Power Supply

Ordering Information

RF2320	Linear General Purpose Amplifier
RF2320 PCBA	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
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Greensboro, NC 27409, USA

Tel (336) 664 1233
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http://www.rfmd.com

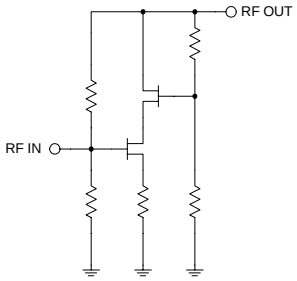
Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current	175	mA
Device Voltage	9	V
Input RF Power	+10	dBm
Output Load VSWR	20:1	
Ambient Operating Temperature	-40 to +85	℃
Storage Temperature	-40 to +150	°C

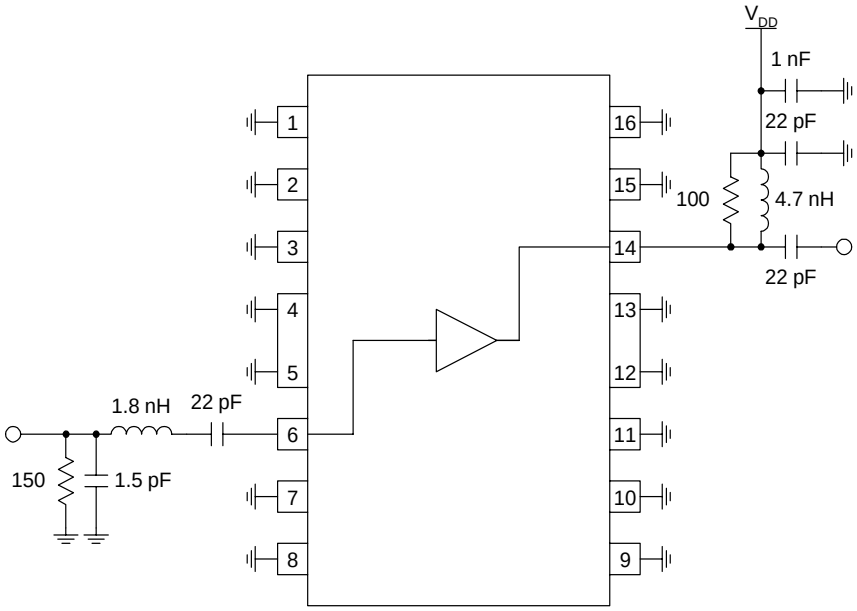
Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (50Ω)					T=25 °C, V_{DD}=7V, 50Ω System, P_{IN}=-10dBm
Frequency Range		5 to 2500		MHz	3dB Bandwidth
Input VSWR		2:1			Appropriate values for the DC blocking capacitor and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output VSWR		1.3:1			See note for Input VSWR.
Gain		15		dB	At 100MHz
		16		dB	At 2000MHz
Gain Flatness		+/-1		dB	From 5MHz to 2500MHz
Noise Figure		1.8		dB	From 5MHz to 900MHz
		2.6		dB	From 900MHz to 2500MHz,
Output IP_3		35		dBm	At 100MHz
		36		dBm	At 1000MHz
Output IP_2		39.6		dBm	At 1000MHz
Output P_{1dB}		21.5		dBm	At 100MHz
		22.5		dBm	At 1000MHz
		18		dBm	At 2000MHz
Reverse Isolation		20		dB	
					T=25 °C, V_{DD}=9V, 50Ω System, P_{IN}=-10dBm
Gain		16.5		dB	At 100MHz
		16.7		dB	At 1000MHz
Noise Figure		1.8		dB	From 5MHz to 900MHz,
		2.6		dB	From 900MHz to 2500MHz,
Output IP_3		36		dBm	At 100MHz
		36.3		dBm	At 1000MHz
Output IP_2		39.8		dBm	At 1000MHz
Output P_{1dB}		23		dBm	At 100MHz
		24.7		dBm	At 1000MHz
		19.5		dBm	At 2000MHz
Power Supply					
Supply Voltage (V_{DD})	6	7	9	V	
Operating Current Range	75	85	100	mA	

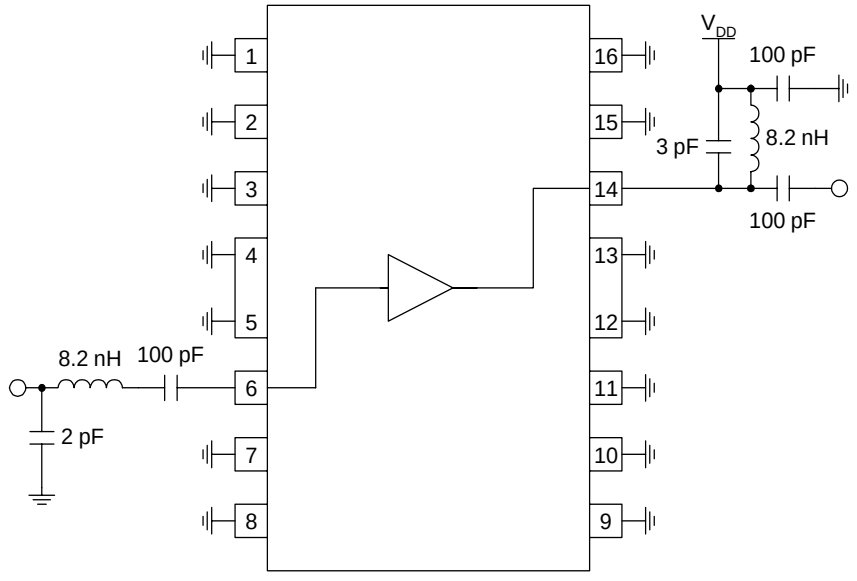
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (75Ω)					T=25°C, V_{DD}=7V, 75Ω System, P_{IN}=-8dBm
Frequency Range		5 to 2500		MHz	3dB Bandwidth
Input VSWR		1.6:1			Appropriate values for the output DC blocking capacitor and bias inductor are required to maintain this VSWR over the intended operating frequency range.
Output VSWR		1.3:1			See note for input VSWR.
Gain		15		dB	At 500MHz
Gain Flatness		+1-0.5		dB	5MHz to 1000MHz
Output IP_3		34.6		dBm	At 10MHz, Delta F1 and F2 = 1MHz
		36.1		dBm	At 500MHz
		33.1		dBm	At 1000MHz
Output IP_2		49.9		dBm	At 100MHz, Delta F1 and F2 = 156MHz
		48.5		dBm	At 1000MHz
Output IP_{1dB}		21		dBm	At 10MHz
		23		dBm	At 500MHz
		22		dBm	At 1000MHz
110 Channels					10dBmV per channel, flat, at the input of the amplifier; V_{CC}=7V, I_{CC}=75mA
XMOD		-71		dBc	At 55.25MHz
		-72		dBc	At 331.25MHz
		-72		dBc	At 547.25MHz
CTB		-79		dBc	At 55.25MHz
		-78		dBc	At 331.25MHz
		-78		dBc	At 547.25MHz
CSO+1.25MHz		-91		dBc	At 55.25MHz
		-58		dBc	At 331.25MHz
		-56		dBc	At 547.25MHz
CSO-1.25MHz		-51		dBc	At 55.25MHz
		-53		dBc	At 331.25MHz
		-58		dBc	At 547.25MHz
CNR		+65		dB	At 55.25MHz
		+64		dB	At 331.25MHz
		+64		dB	At 547.25MHz
Power Supply					
Supply Voltage (V_{DD})	6	7	9	V	
Operating Current Range	75	85	100	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 not internally DC blocked. A DC blocking capacitor suitable for the frequency of operation is required if DC is present from the previous stage. The gate voltage is nominally 0V but can be raised externally to increase the bias level. This will increase the current drain but improve linearity.	
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
1930-1990MHz Narrowband Operation

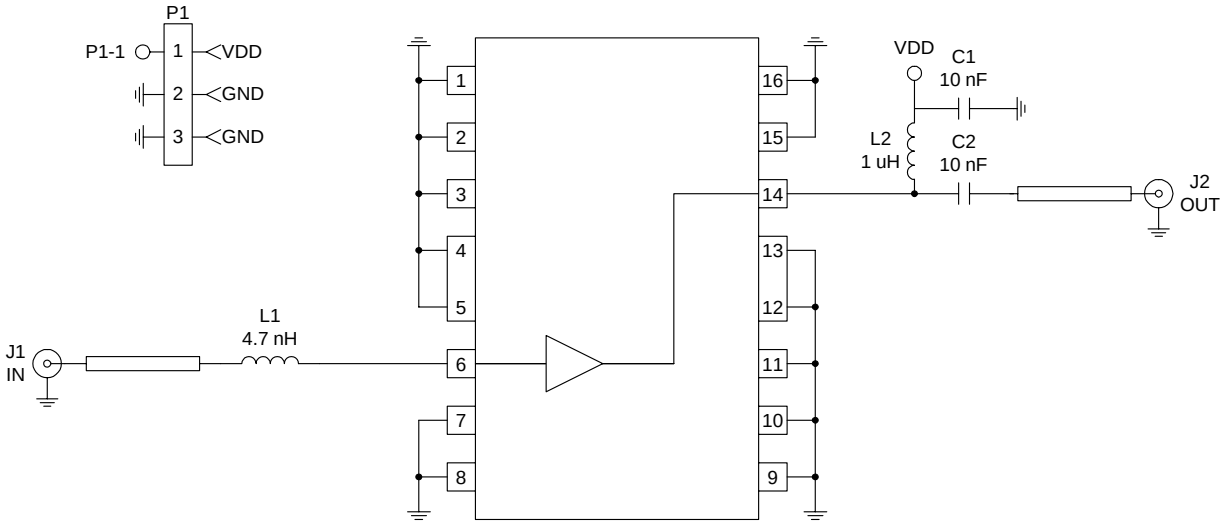


Application Schematic
869-894MHz Narrowband Operation



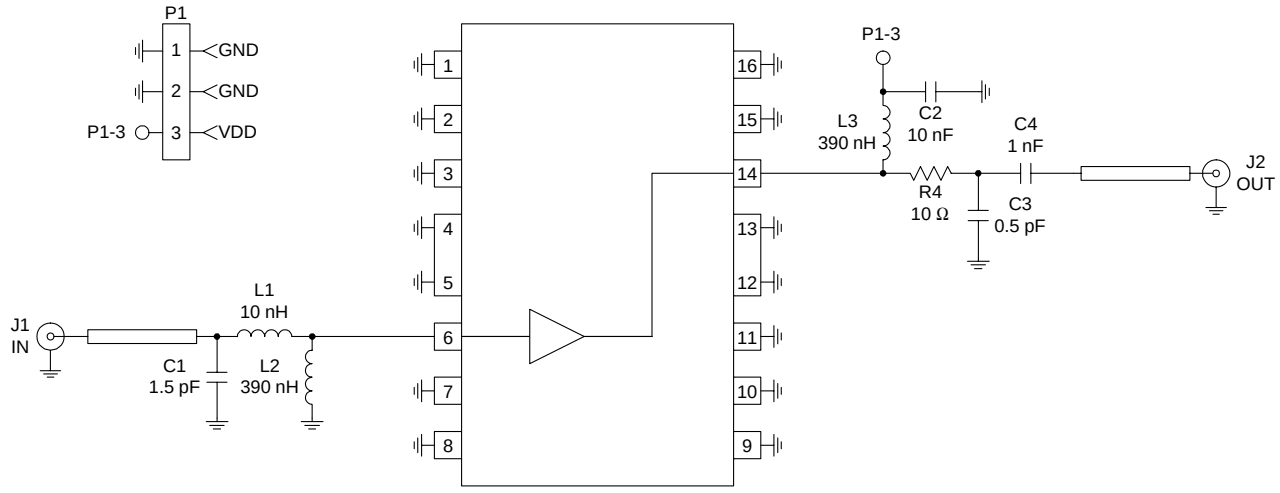
Evaluation Board Schematic - 50Ω

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



Drawing 2320400 Rev 1

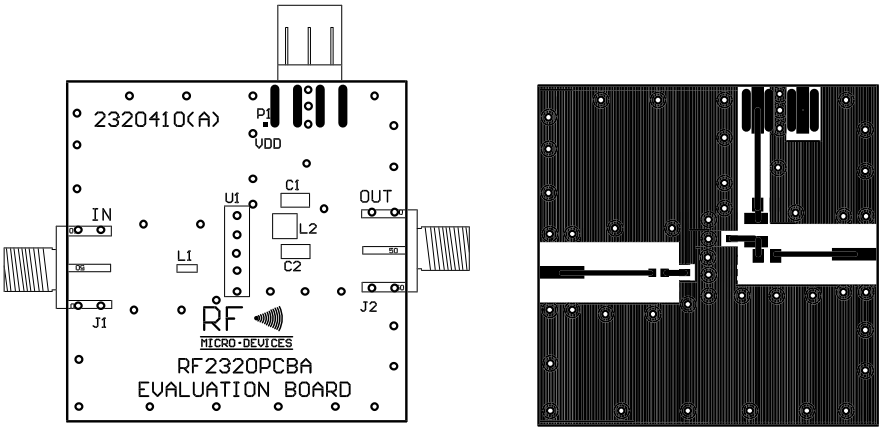
Evaluation Board Schematic - 75Ω



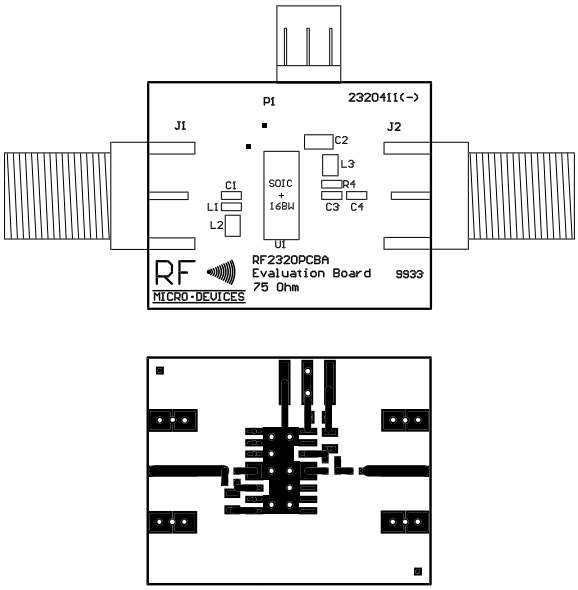
Drawing 2320401 Rev -

NOTES:
J1 and J2 are 75 ΩF connectors.

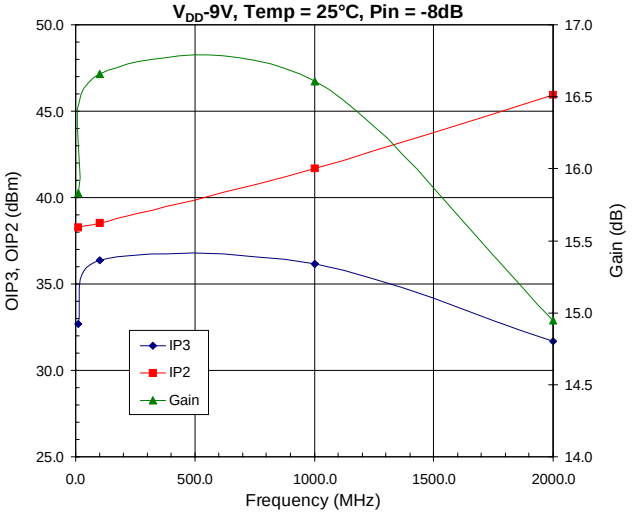
Evaluation Board Layout - 50Ω
Board Size 1.5” x 1.5”
Board Thickness 0.031”, Board Material FR-4



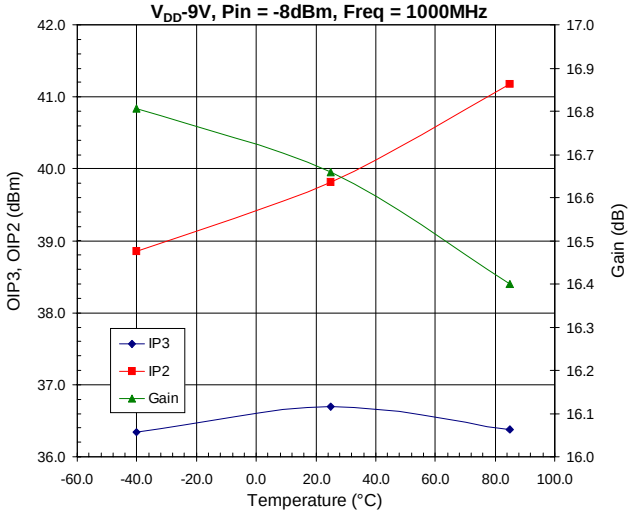
Evaluation Board Layout - 75Ω
Board Thickness 0.062”, Board Material FR-4



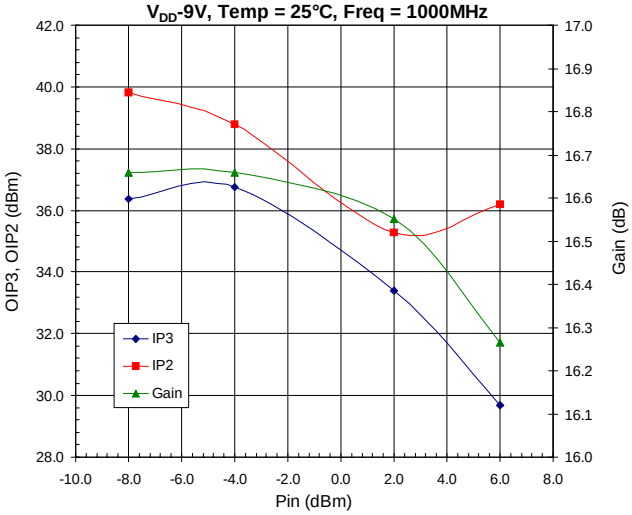
Gain, OIP3, and OIP2 versus Frequency
V_{DD}-9V, Temp = 25°C, Pin = -8dB



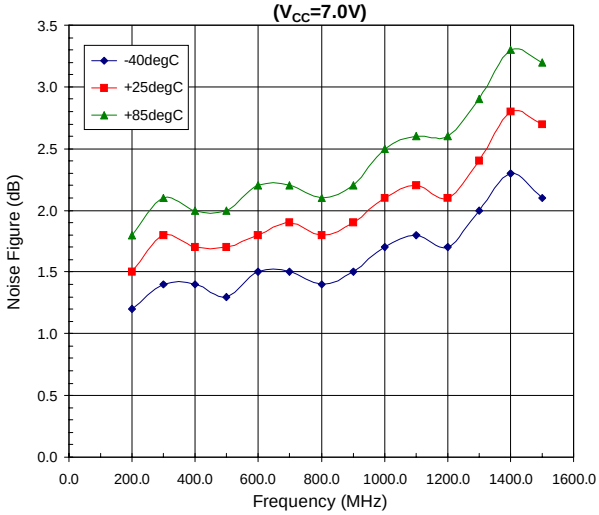
Gain, OIP3, and OIP2 versus Temperature
V_{DD}-9V, Pin = -8dBm, Freq = 1000MHz



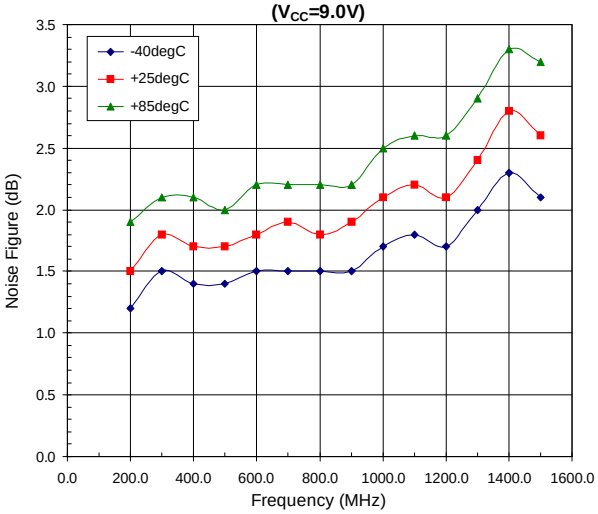
Gain, OIP3, and OIP2 versus Pin
V_{DD}-9V, Temp = 25°C, Freq = 1000MHz

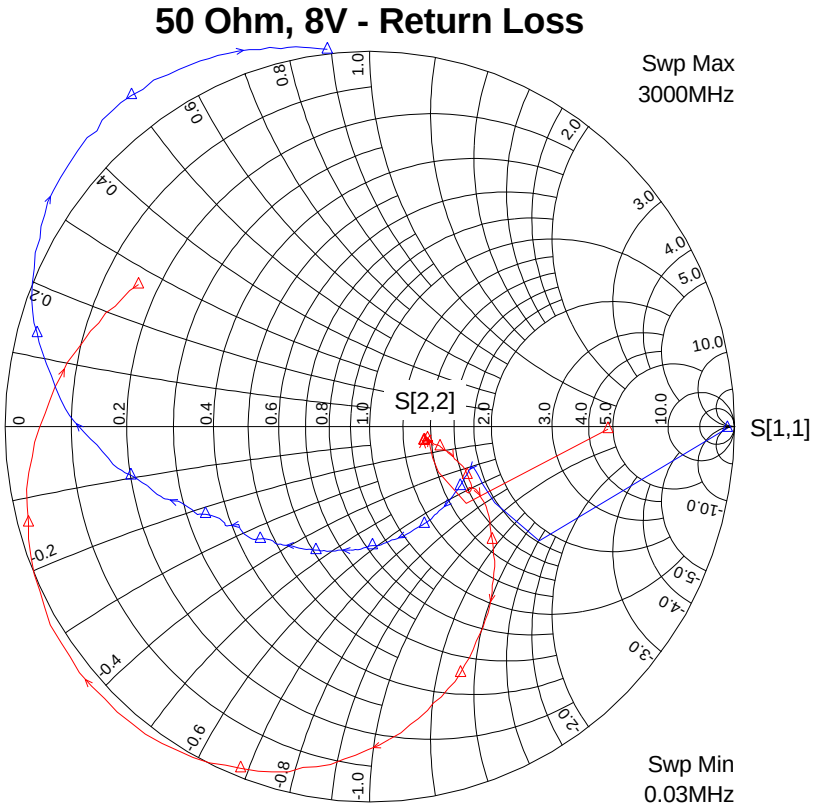


Noise Figure versus Frequency Across Temperature
(V_{CC}=7.0V)



Noise Figure versus Frequency Across Temperature
(V_{CC}=9.0V)




50 Ohm, 8V - Return Loss
Swp Max
3000MHz
S[2,2]
S[1,1]
Swp Min
0.03MHz

75 Ohm, 8V - Return Loss