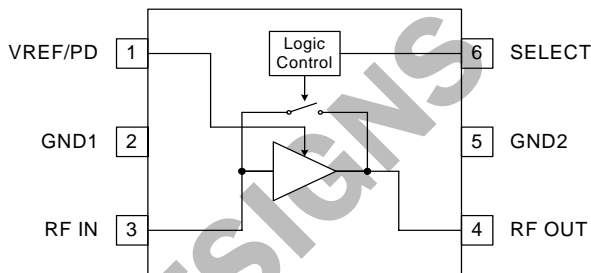


**Features**

- Low Noise and High Intercept Point
- Adjustable Bias Current
- LNA Bypass Loss is +2dB
- 150MHz to 2500MHz Operation
- Meets IMD Tests with Two Gain States/Single Logic Control Line

**Applications**

- CDMA/Cellular Bypass LNA
- CDMA/Cellular Bypass Driver Amplifier
- General Purpose Amplification
- Commercial and Consumer Systems



Functional Block Diagram

**Product Description**

The RF2369 is a switchable low noise amplifier with a very high dynamic range designed for digital cellular applications. The device functions as an outstanding front end low noise amplifier. When used as an LNA, the bias current can be set externally. When used as a PA driver, the IC can operate directly from a single cell Li-ion battery and includes a power down feature that can be used to completely turn off the device. The IC is featured in a standard SOT 6-lead plastic package.

**Ordering Information**

RF2369                      3V Low Noise Amplifier/ 3V PA Driver Amplifier  
RF2369PCBA-41X       Fully Assembled Evaluation Board (LNA)

**Optimum Technology Matching® Applied**

- |  |                                      |                                     |                                   |
|--|--------------------------------------|-------------------------------------|-----------------------------------|
| <input checked="" type="checkbox"/> GaAs HBT | <input type="checkbox"/> SiGe BiCMOS | <input type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT |
| <input type="checkbox"/> GaAs MESFET         | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS    |                                   |
| <input type="checkbox"/> InGaP HBT           | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT     |                                   |

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## 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.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					T <sub>AMB</sub> = 25°C, V <sub>CC</sub> = 3.0V
Frequency Range	150	824 to 894	2500	MHz	
<b>Cellular Low Noise Amplifier</b>					
Frequency	869		894	MHz	
HIGH GAIN MODE					Gain Select < 0.8V, V <sub>PD</sub> /V <sub>REF</sub> = 3V
Gain	14.0	15.5	17.0	dB	
Noise Figure		1.6	2.0	dB	
Input IP3	9.0	11.5		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		7.5	10.0	mA	
BYPASS MODE					Gain Select > 1.8V, V <sub>PD</sub> /V <sub>REF</sub> = 0V
Gain	-3	-2	-1	dB	
Input IP3	+10	+24		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		2.0	4.0	mA	
<b>Cellular CDMA Driver</b>					
Frequency	824		849	MHz	
HIGH GAIN MODE					Gain Select < 0.8V, V <sub>PD</sub> /V <sub>REF</sub> = 3V
Gain	14.0	15.5	17.0	dB	
Noise Figure		2.0	2.5	dB	
Output Power	4			dBm	
ACPR1		-65		dBc/30kHz	P <sub>OUT</sub> = +4 dBm, ±885 kHz offset
ACPR2		-70		dBc/30kHz	P <sub>OUT</sub> = +4 dBm, ±1.98 MHz offset
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		8.5		mA	
BYPASS MODE					Gain Select > 1.8V, V <sub>PD</sub> /V <sub>REF</sub> = 0V
Gain	-3.0	-2.0	-1.0	dB	
Input IP3	+10	+24		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		2.0	4.0	mA	

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Power Supply</b>					
Voltage ( $V_{CC}$ )		3		V	
$V_{SELECT}$ Low			0.8	V	High Gain mode. Select < 0.8V, $V_{PD}/V_{REF}=3V$
$V_{SELECT}$ High	1.8			V	Low Gain mode. Select > 1.8V, $V_{PD}/V_{REF}=0V$
Power Down	0		10	$\mu A$	Gain Select < 0.8V, $V_{PD}/V_{REF}=0V$ , $V_{CC}=0V$

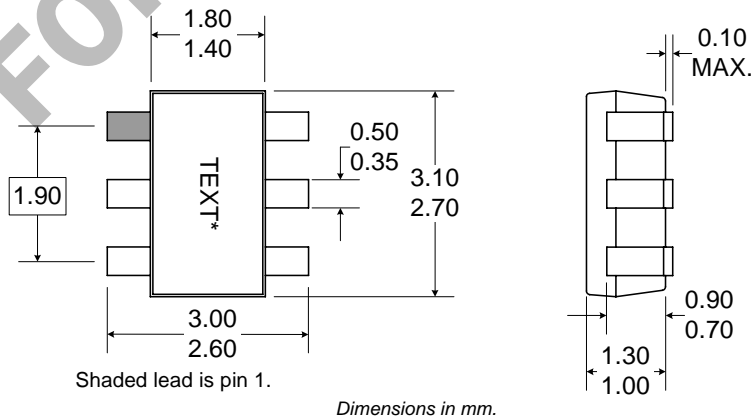
**Bypass Possibility**

Gain Select	$V_{PD}/V_{REF}$	$V_{CC}$	Current	Comments
>1.8V	0V	3V	2.3mA	Recommended Bypass Mode
>1.8V	3V	3V	3.4mA	Alternative Bypass Mode

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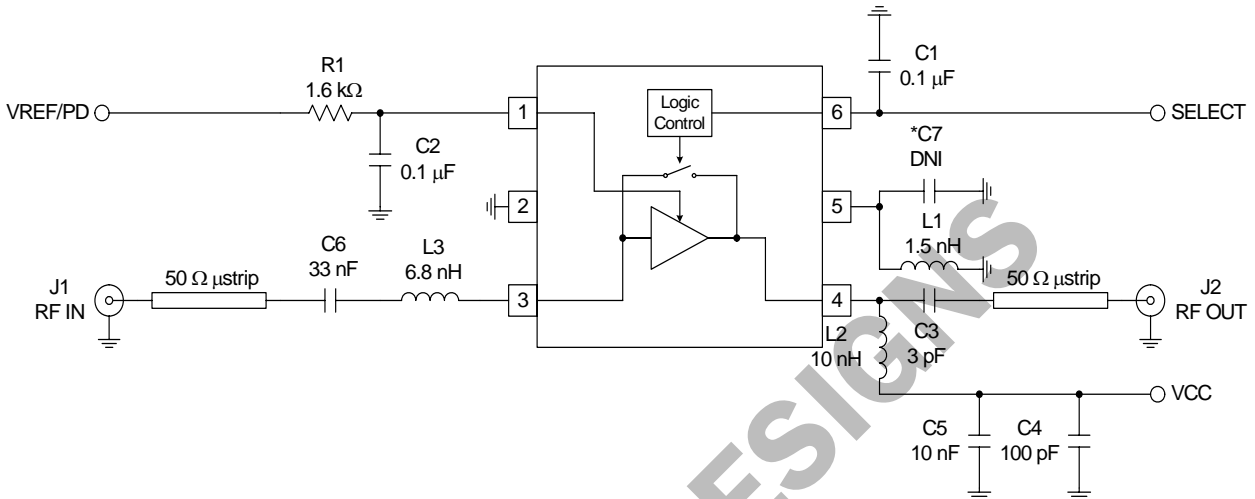
Pin	Function	Description	Interface Schematic
1	VREF/PD	For low noise amplifier applications, this pin is used to control the bias current. An external resistor can be used to set the bias current for any $V_{PD}$ voltage.	
2	GND1	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
3	RF IN	RF input pin.	
4	RF OUT	Amplifier output pin. This pin is an open-collector output. It must be biased to $V_{CC}$ 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.	
5	GND2	LNA emittance inductance. Total inductance is comprised of package + bondwire + stripline (L1) on PCB.	
6	SELECT	This pin selects high gain and bypass. Select $\leq 0.8V$ , high gain. Select $\geq 1.8V$ , low gain.	

## Package Drawing



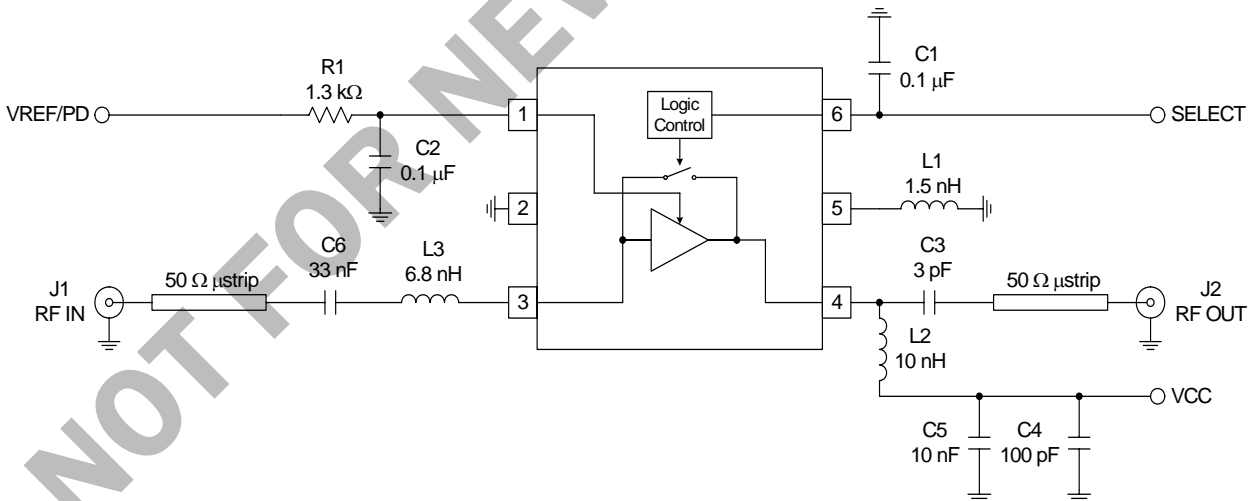
\*When Pin 1 is in upper left, text reads downward (as shown).

**Application Schematic  
Cellular Low Noise Amplifier ~ 881MHz**

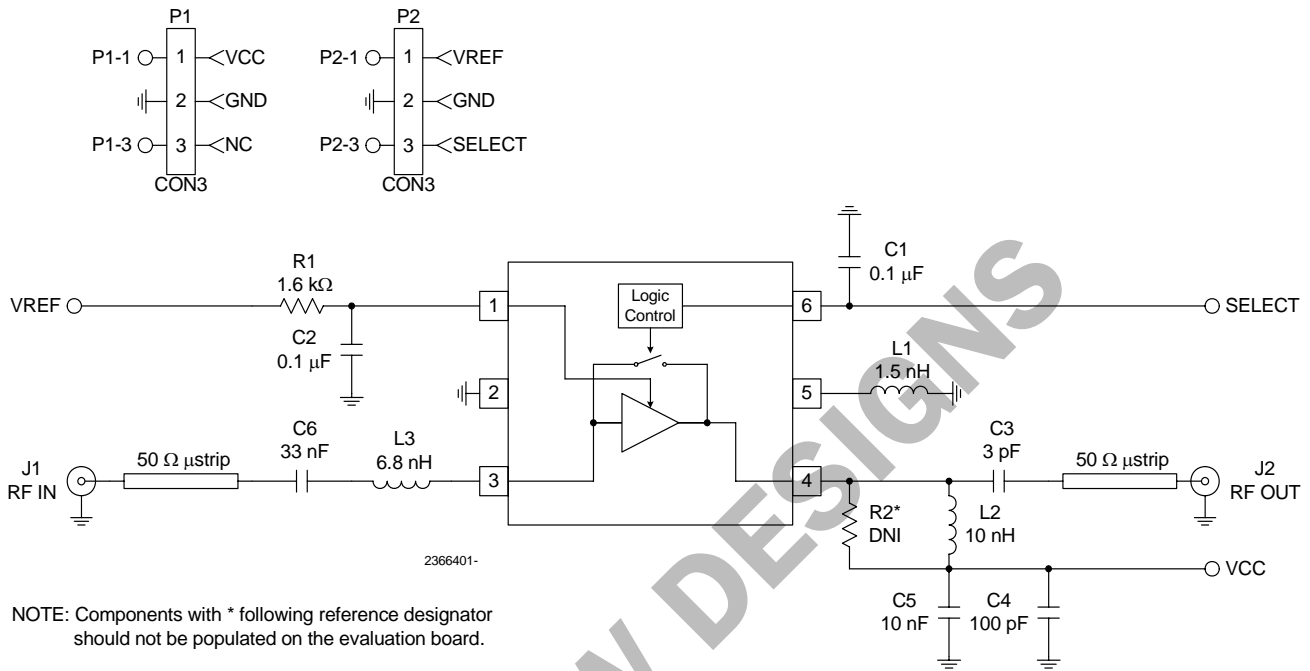


\* It is recommended added to initial customer PCBA layout for flexibility to optimize performance.

**Application Schematic  
Cellular Driver Amplifier ~ 836MHz**

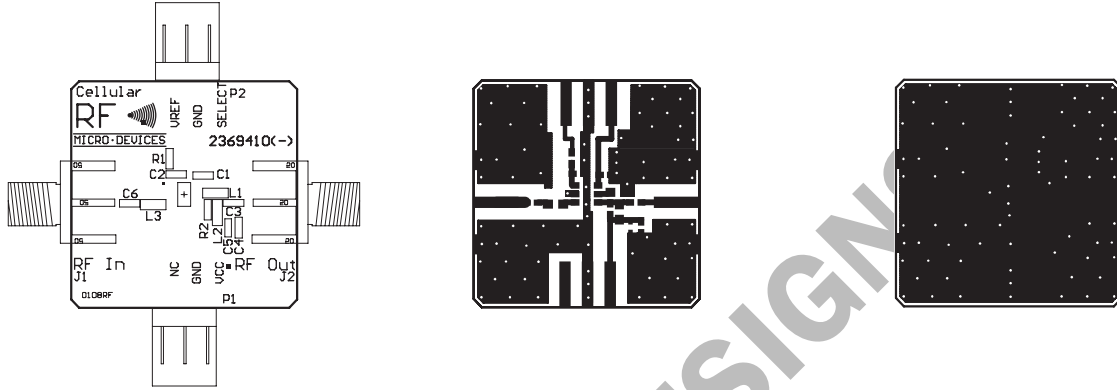


## Evaluation Board Schematic - Cellular LNA



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**Evaluation Board Layout**  
**Board Size 1.0" x 1.0"**  
**Board Thickness 0.032", Board Material FR-4**



NOT FOR NEW DESIGN

## RoHS\* Banned Material Content

RoHS Compliant: Yes  
 Package total weight in grams (g) 0.013  
 Compliance Date Code: 435  
 Bill of Materials Revision: Rev: B  
 Pb Free Category: e3

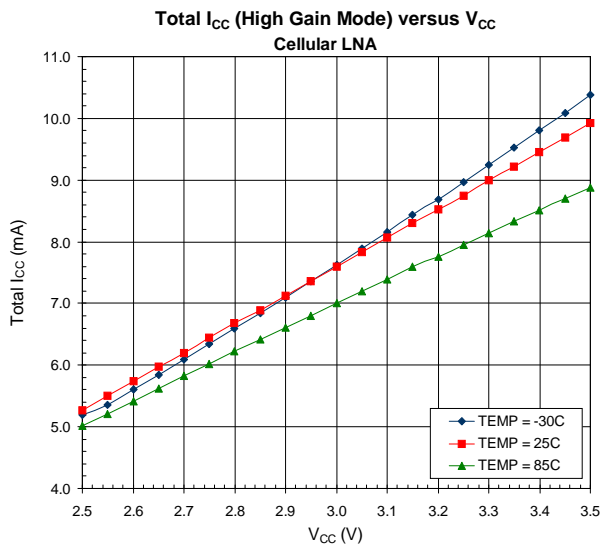
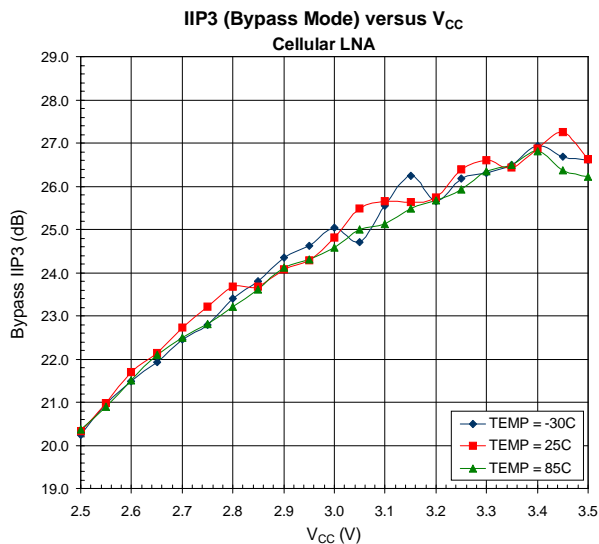
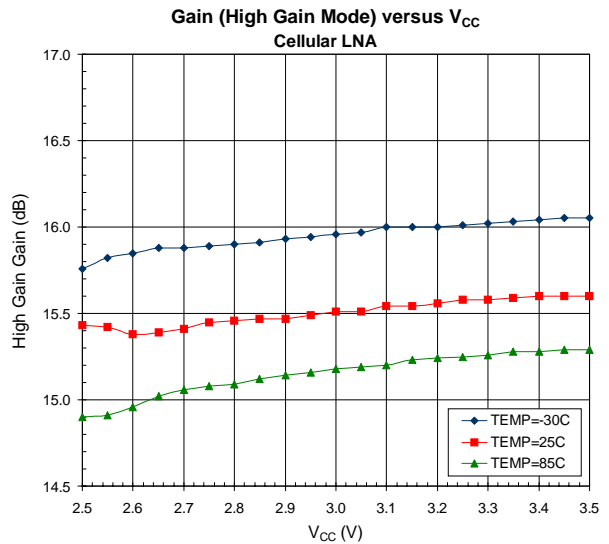
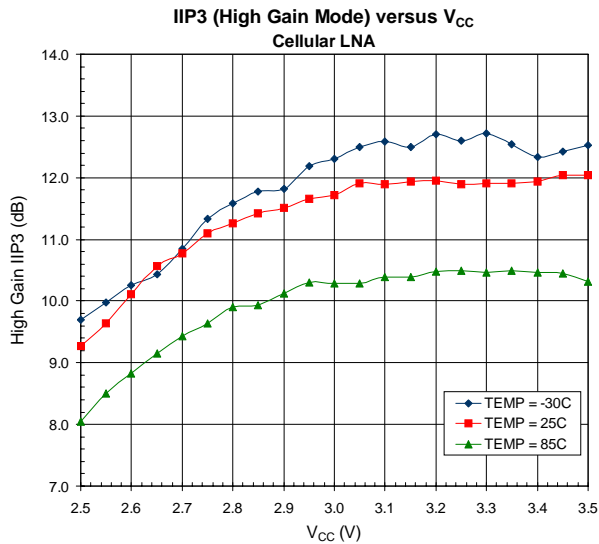
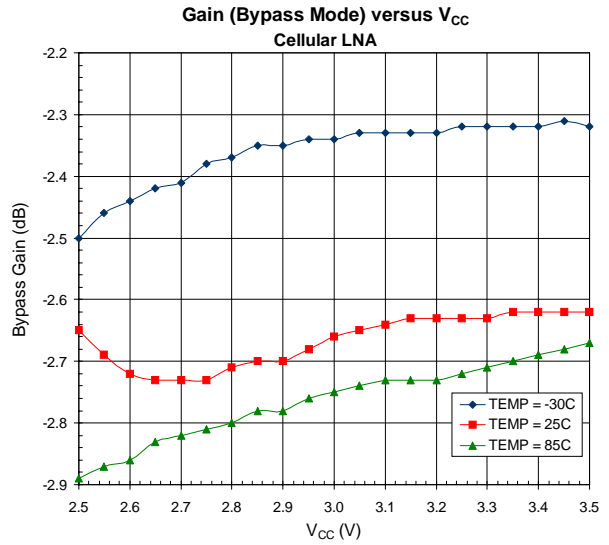
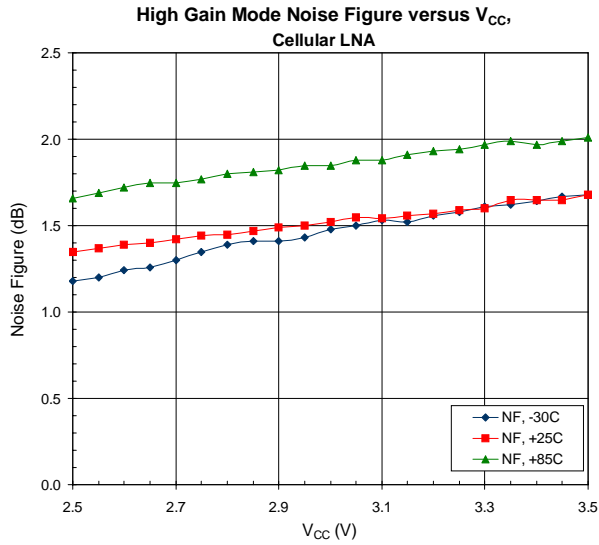
Bill of Materials	Parts Per Million (PPM)					
	Pb	Cd	Hg	Cr VI	PBB	PBDE
Die	0	0	0	0	0	0
Molding Compound	0	0	0	0	0	0
Lead Frame	0	0	0	0	0	0
Die Attach Epoxy	0	0	0	0	0	0
Wire	0	0	0	0	0	0
Solder Plating	0	0	0	0	0	0

**This RoHS banned material content declaration was prepared solely on information, including analytical data, provided to RFMD by its suppliers, and applies to the Bill of Materials (BOM) revision noted above.**

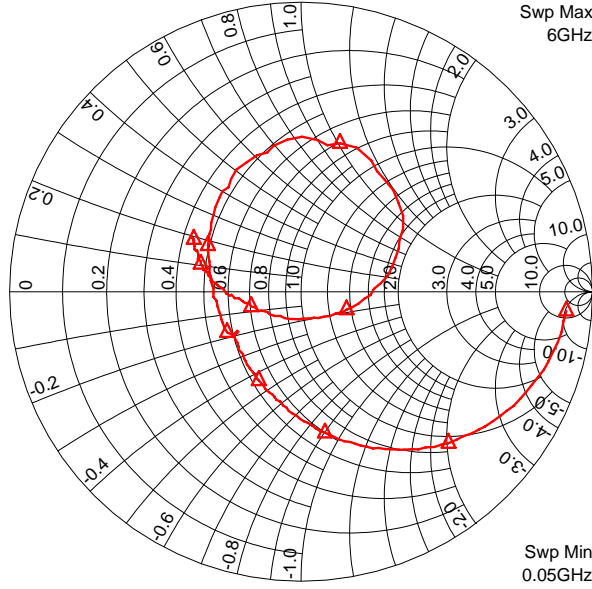
\* DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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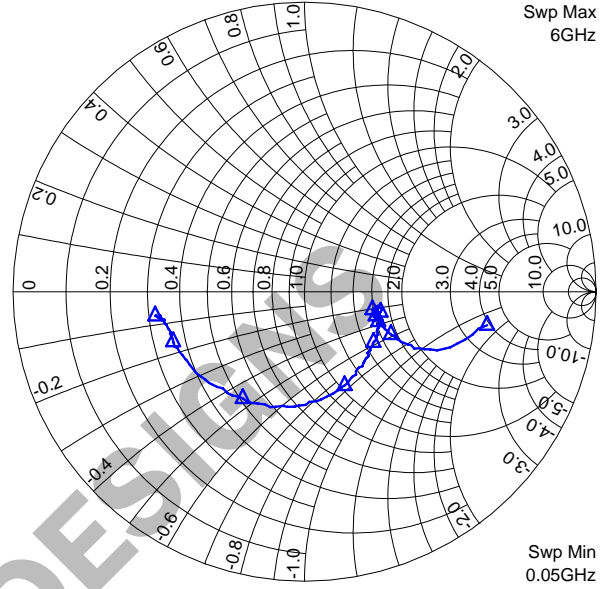




### Bypass

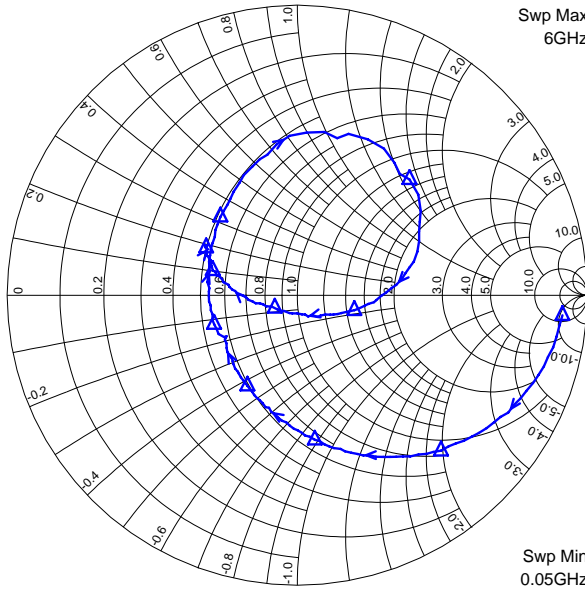


### High Gain



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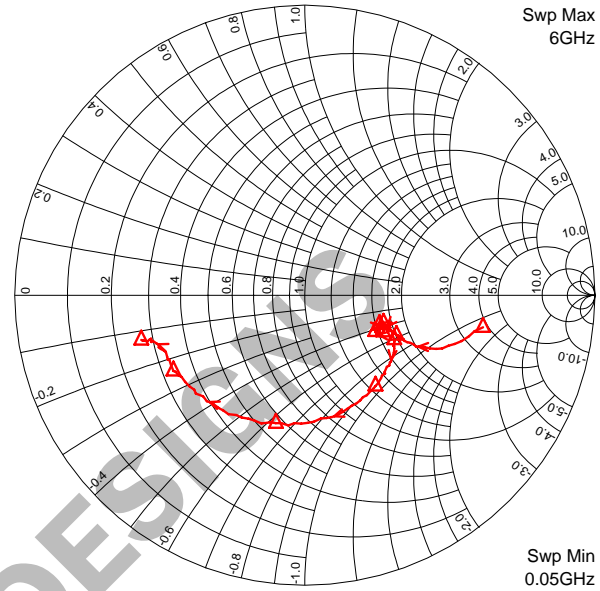
**S11 Bypass Mode**



Swp Max  
6GHz

Swp Min  
0.05GHz

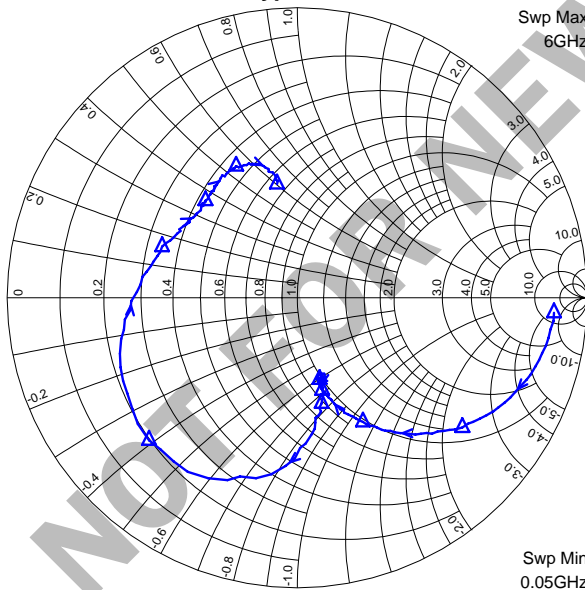
**S11 High Gain Mode**



Swp Max  
6GHz

Swp Min  
0.05GHz

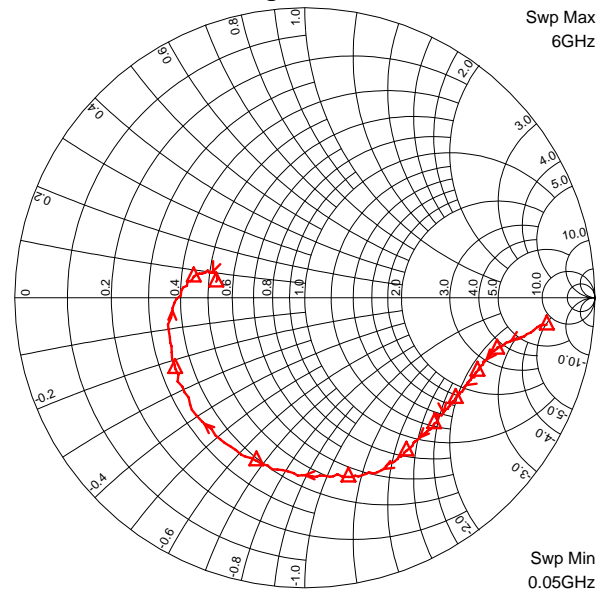
**S22 Bypass Mode**



Swp Max  
6GHz

Swp Min  
0.05GHz

**S22 High Gain Mode**



Swp Max  
6GHz

Swp Min  
0.05GHz

**NOT FOR NEW DESIGNS**