RF2364

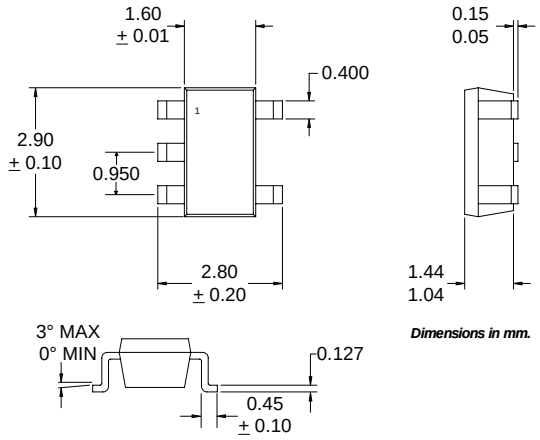
3V PCS LOW NOISE AMPLIFIER

Typical Applications

- CDMA PCS LNA
- TDMA PCS LNA
- W-CDMA/CDMA2000 LNA
- General Purpose Amplification
- Commercial and Consumer Systems

Product Description

The RF2364 is a low noise amplifier with a high dynamic range designed for CDMA and TDMA PCS, as well as W-CDMA/CDMA2000 applications. The device functions as an outstanding front end low noise amplifier and the bias current can be set externally. The IC includes a power down feature used to completely turn-off the device and is featured in a standard SOT 5-lead plastic package.



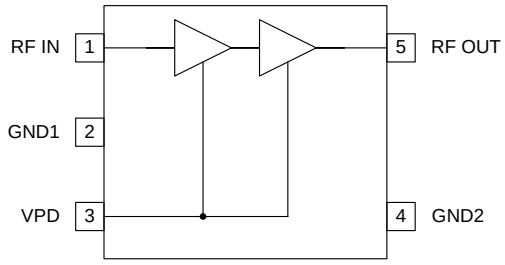
Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS
- ☐ InGaP/HBT
- ☐ GaN HEMT
- ☐ SiGe Bi-CMOS

Package Style: SOT 5-Lead

Features

- Low Noise and High Intercept Point
- 18dB Gain
- Power Down Control
- Single 3.0V Power Supply
- PCS and W-CDMA Band Operation
- 1.8GHz to 2.5GHz Operation



Functional Block Diagram

Ordering Information

RF2364	3V PCS Low Noise Amplifier
RF2364 PCBA	Fully Assembled Evaluation Board

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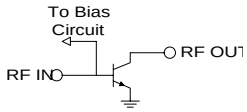
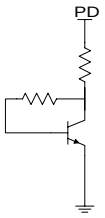
Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +8.0	V_{DC}
Input RF Level	+10	dBm
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).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Operating Range					
Overall Frequency Range	1930		1990	MHz	
Supply Voltage (V_{CC})	2.7	3.0	3.3	V	
Power Down Voltage (V_{PD})	2.7		2.9	V	For normal operation
			0.9	V	For power down operation
Current Consumption		17.0	23.5	mA	V_{CC}=3.0V, Values reflect I_{CC}+I_{PD}
Power Down Current			10	μA	V_{CC}=3.0V, V_{PD}≤0.9V
Operating Ambient Temperature	-40		+85	°C	
Input Impedance		50		Ω	
Output Impedance		50		Ω	
Low Noise Amplifier Performance					T=25°C
Power Gain		18	21	dB	V_{CC}=3.0V, I_{CC}=17mA
Noise Figure		1.8		dB	
Input IP3		+5		dBm	V_{CC}=3.0V
Input VSWR			2:1		
Output VSWR			2:1		With external matching components.
Input P1dB		-8.5		dBm	

Pin	Function	Description	Interface Schematic
1	RF IN	RF input pin. This pin is DC coupled and matched to 50Ω.	
2	GND1	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
3	VPD	For low noise amplifier applications, this pin is used to control the bias current. See plots for bias current settings. An external resistor (R1) can be used to set the bias current for any V_{PD} voltage (See Application Note). For driver amplifier applications, this is the Power Down pin for the IC. V_{PD}=2.8V ± 0.1V is required for proper operation. V_{PD}< 0.9V turns off the Part. External RF 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. Nominal current required for V_{PD}=2.8V is 2.0mA typical and 3.0mA Max (@ V_{PD}=2.9V).	
4	GND2	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
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 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	

Application Notes

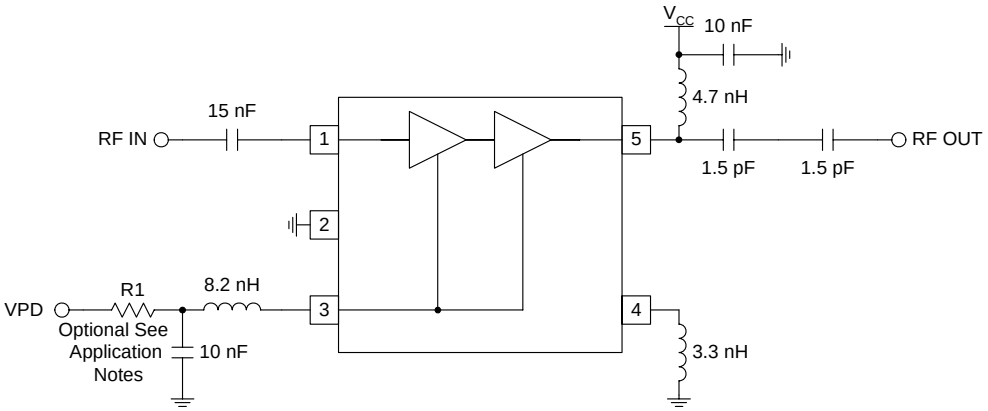
Power Down Pin Resistor

The Power Down pin (pin 3) of the RF2364 3V Low Noise Amplifier should be maintained at 2.7V to 2.9V for proper operation. This voltage range ensures the correct bias current will be present at the Power Down pin of the device. However, an external series resistor may be used to allow various operating voltages at this pin (see R1 in Application Schematics). The required value for this resistor may be roughly calculated by using the operating input voltage to the Power Down pin, the desired voltage at the device, and the typical current consumption for the Power Down pin, along with Ohms law.

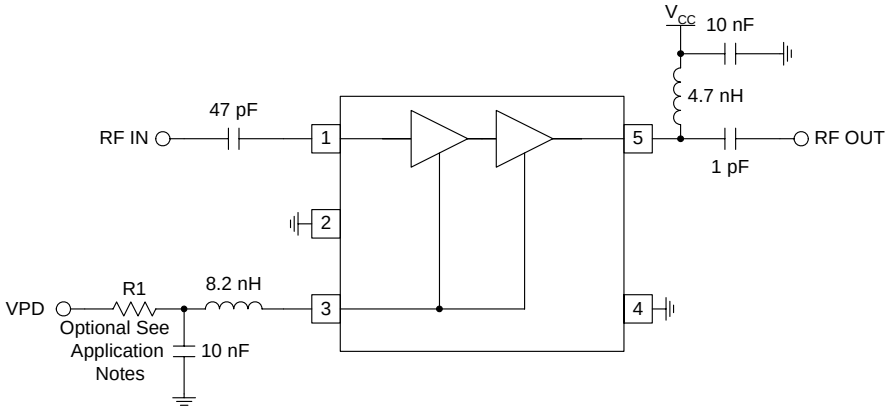
For example, assume the design will supply 3.3V to the Power Down pin of the device, but the biasing circuitry internal to the RF2364 requires 2.8V, and the power down bias current is known to typically be 5.5mA, then the required value from R1 would be found from:

$$\frac{3.3V - 2.8V}{5.5mA} = 90.9\Omega$$

Application Schematic
PCS Band

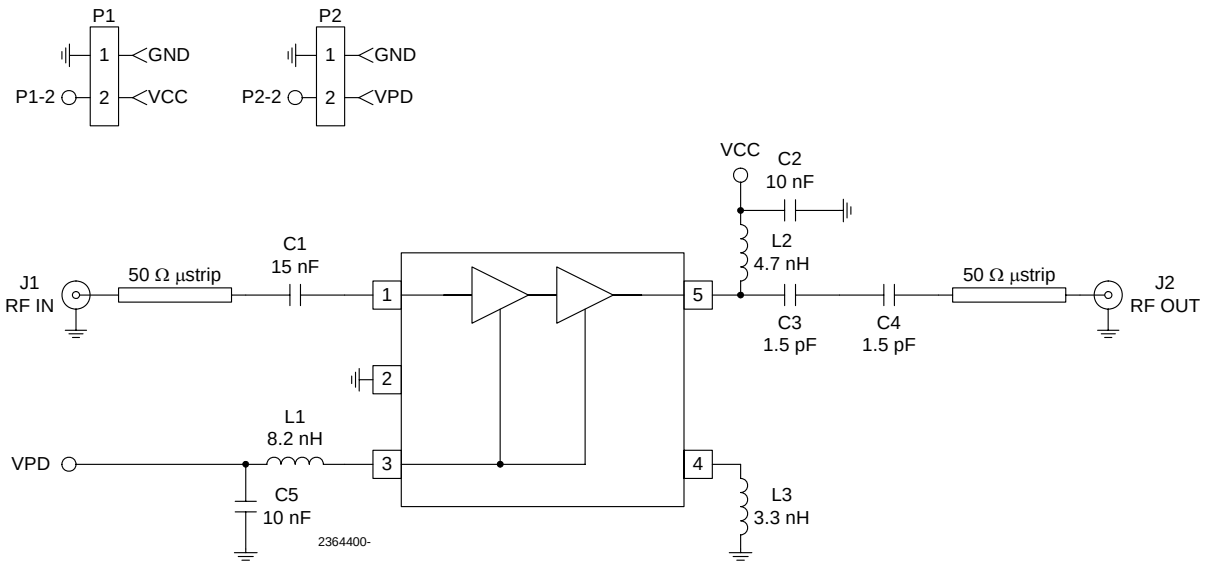


Application Schematic
W-CDMA Band

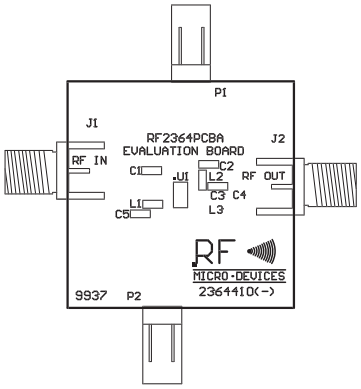


Evaluation Board Schematic - PCS Band

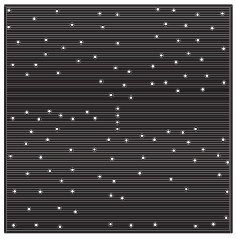
(Download Bill of Materials from www.rfmd.com.)

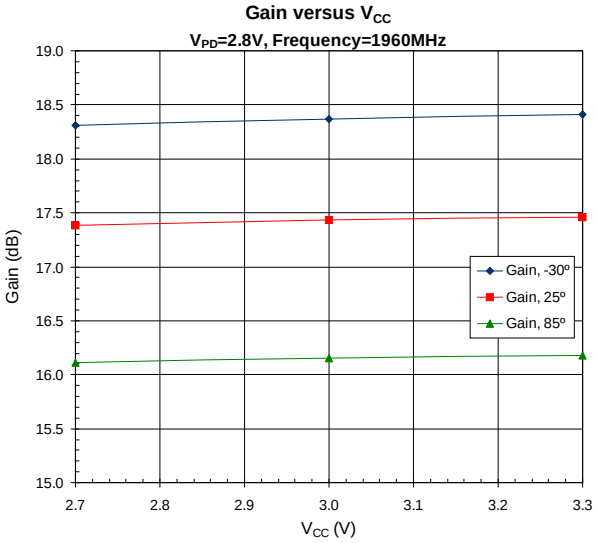


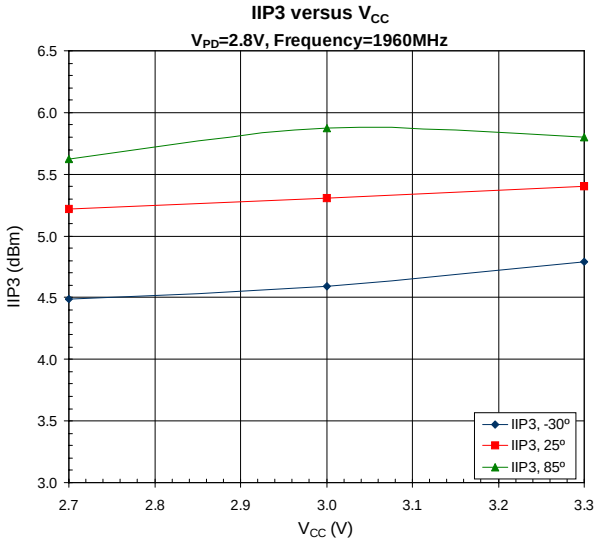
Evaluation Board Layout
Board Size 1” x 1”
Board Thickness 0.031”; Board Material FR-4

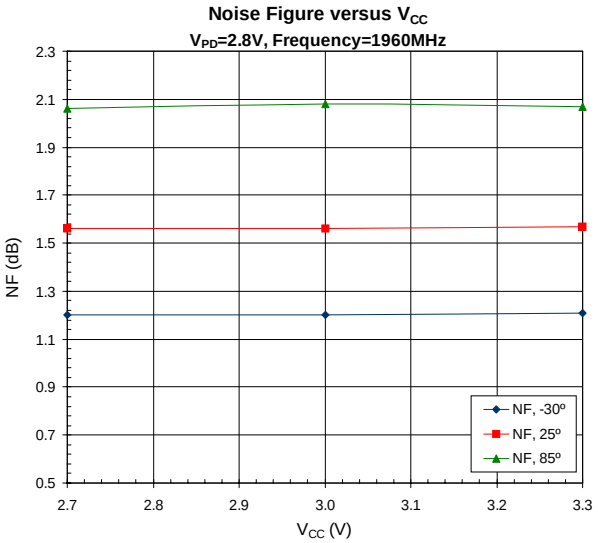


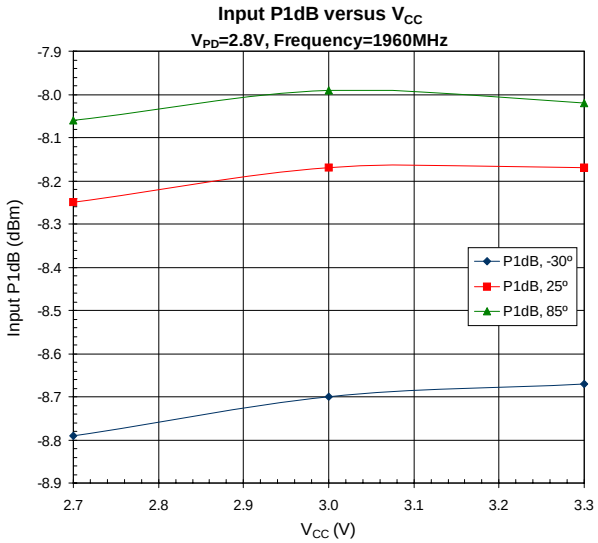


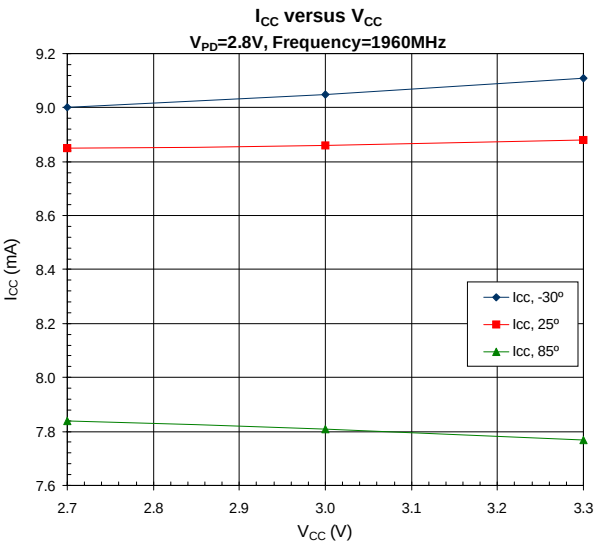


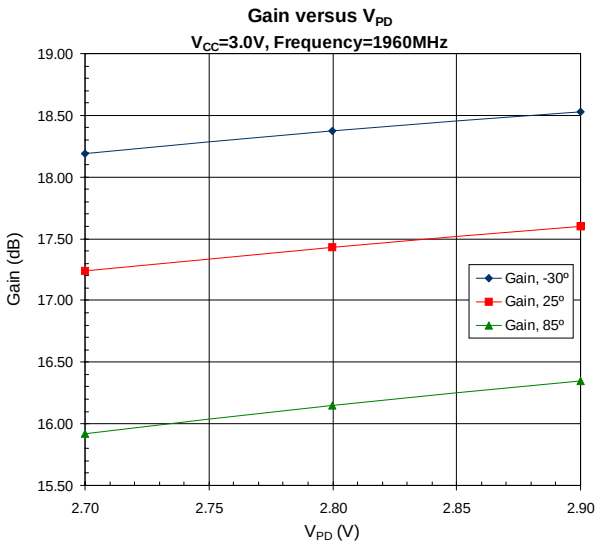

Gain versus V_{CC}
V_{PD}=2.8V, Frequency=1960MHz
Gain (dB)
V_{CC} (V)
Gain, -30º
Gain, 25º
Gain, 85º

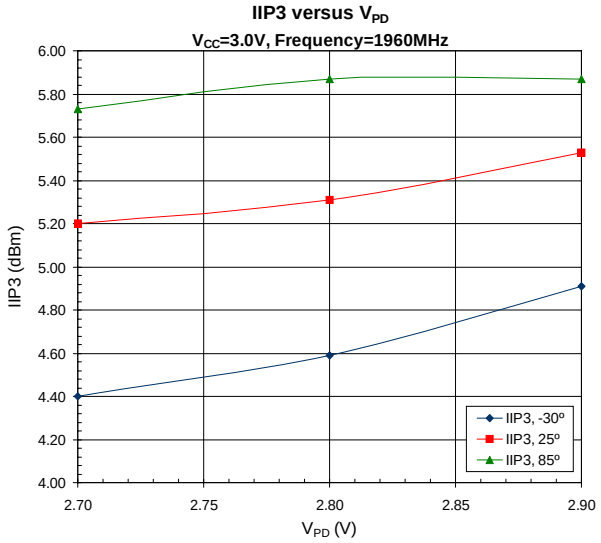

IIP3 versus V_{CC}
V_{PD}=2.8V, Frequency=1960MHz
IIP3 (dBm)
V_{CC} (V)
IIP3, -30º
IIP3, 25º
IIP3, 85º

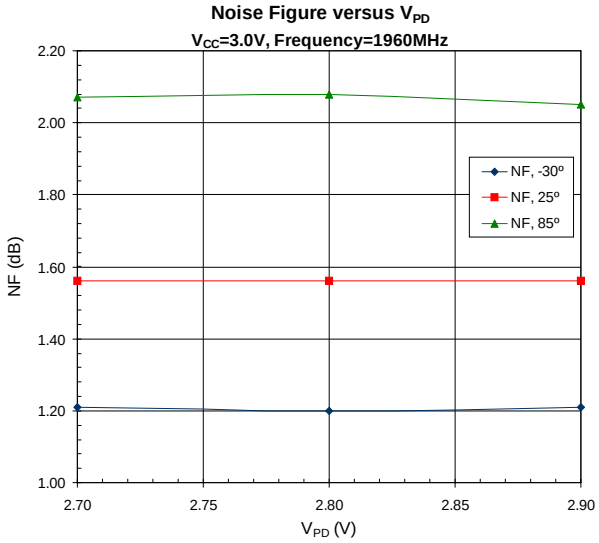

Noise Figure versus V_{CC}
V_{PD}=2.8V, Frequency=1960MHz
NF (dB)
V_{CC} (V)
NF, -30º
NF, 25º
NF, 85º

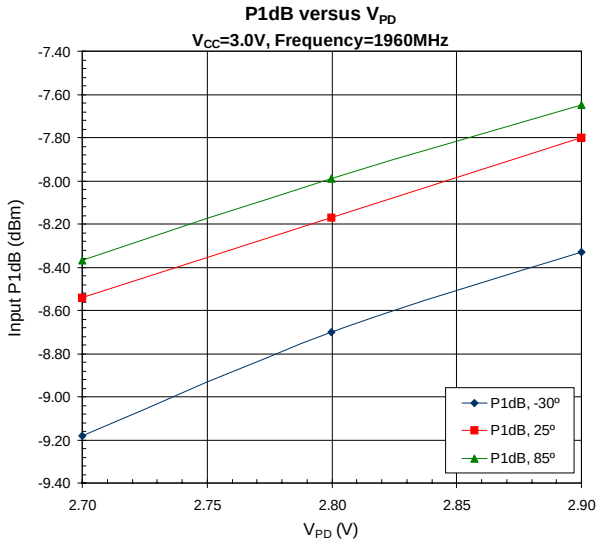

Input P1dB versus V_{CC}
V_{PD}=2.8V, Frequency=1960MHz
Input P1dB (dBm)
V_{CC} (V)
P1dB, -30º
P1dB, 25º
P1dB, 85º

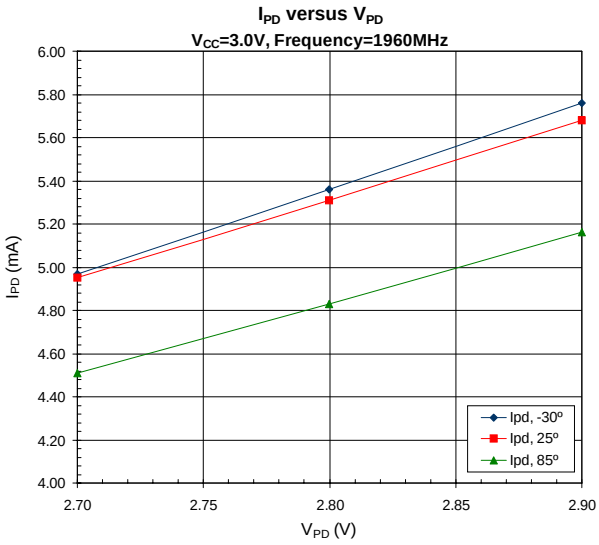

I_{CC} versus V_{CC}
V_{PD}=2.8V, Frequency=1960MHz
I_{CC} (mA)
V_{CC} (V)
Icc, -30º
Icc, 25º
Icc, 85º

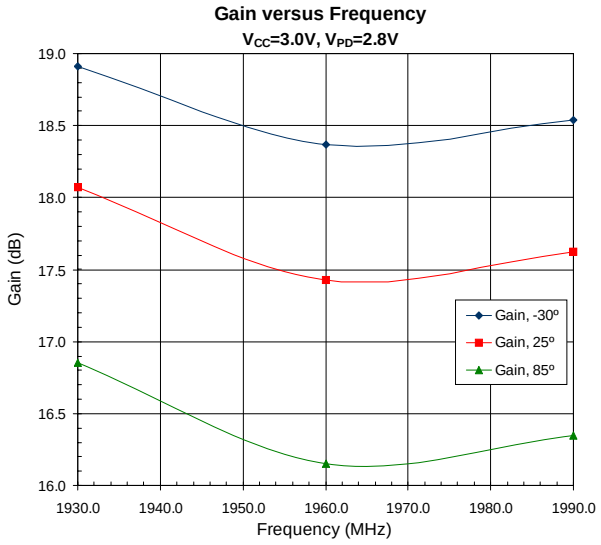

Gain versus V_{PD}
V_{CC}=3.0V, Frequency=1960MHz
Gain (dB)
V_{PD} (V)
Gain, -30º
Gain, 25º
Gain, 85º

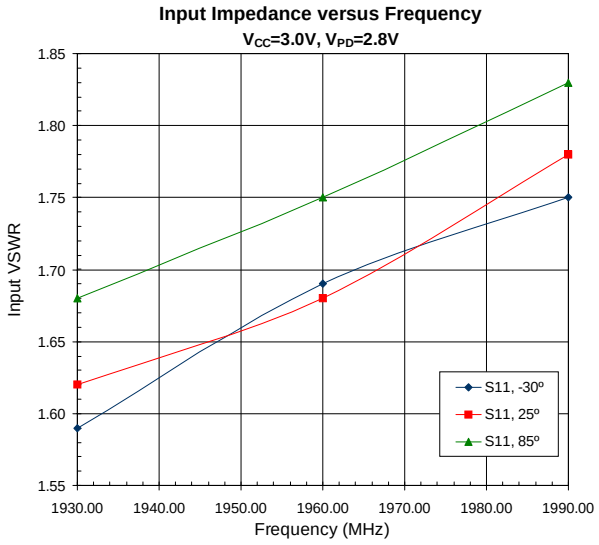

IIP3 versus VPD
VCC=3.0V, Frequency=1960MHz
IIP3 (dBm)
VPD (V)
IIP3, -30º
IIP3, 25º
IIP3, 85º

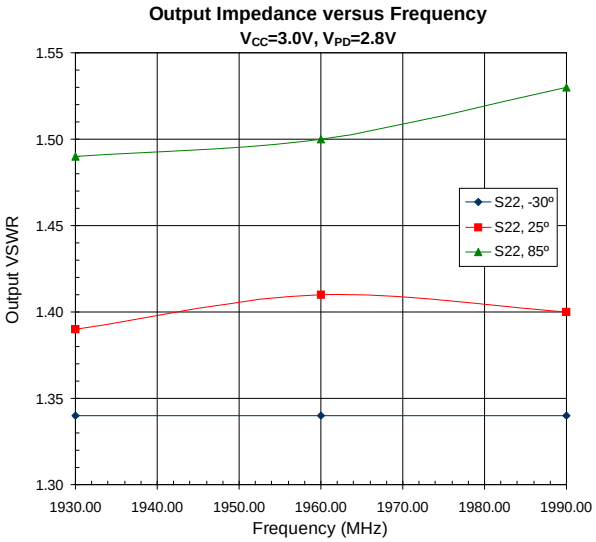

Noise Figure versus VPD
VCC=3.0V, Frequency=1960MHz
NF (dB)
VPD (V)
NF, -30º
NF, 25º
NF, 85º


P1dB versus VPD
VCC=3.0V, Frequency=1960MHz
Input P1dB (dBm)
VPD (V)
P1dB, -30º
P1dB, 25º
P1dB, 85º


IPD versus VPD
VCC=3.0V, Frequency=1960MHz
IPD (mA)
VPD (V)
Ipd, -30º
Ipd, 25º
Ipd, 85º


Gain versus Frequency
VCC=3.0V, VPD=2.8V
Gain (dB)
Frequency (MHz)
Gain, -30º
Gain, 25º
Gain, 85º


Input Impedance versus Frequency
VCC=3.0V, VPD=2.8V
Input VSWR
Frequency (MHz)
S11, -30º
S11, 25º
S11, 85º


Output Impedance versus Frequency
VCC=3.0V, VPD=2.8V
1.55
1.50
1.45
1.40
1.35
1.30
Output VSWR
1930.00
1940.00
1950.00
1960.00
1970.00
1980.00
1990.00
Frequency (MHz)
S22, -30º
S22, 25º
S22, 85º