RF MICRO·DEVICES

Preliminary

RF2373

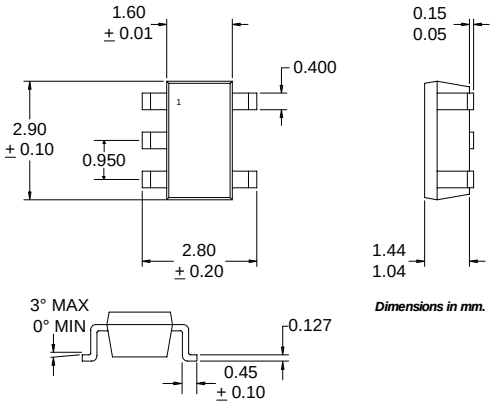
3V LOW NOISE AMPLIFIER/ 3V DRIVER AMPLIFIER

Typical Applications

- WLAN LNA/Driver
- GPS LNA
- CDMA PCS LNA
- Low Noise Transmit Power Amplifier
- General Purpose Amplification
- Driver Amplifier for TX Power Amplifier

Product Description

The RF2373 is a low noise amplifier with a very high dynamic range designed for WLAN and digital cellular applications. The device functions as an outstanding front end low noise amplifier or driver amplifier in the transmit chain of digital subscriber units where low transmit noise power is a concern. 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 5-lead plastic package.



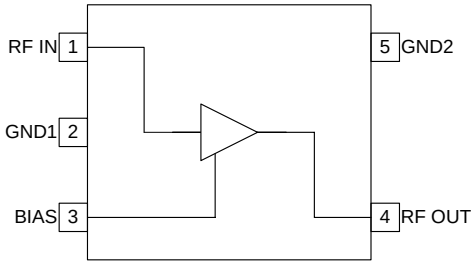
Optimum Technology Matching® Applied

- ☐ 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
- Adjustable Bias Current
- Power Down Control
- Single 1.8V to 6.0V Power Supply
- 400MHz to 3GHz Operation
- Extremely Small SOT 5-Lead Package



Functional Block Diagram

Ordering Information

RF2373	3V Low Noise Amplifier/ 3V Driver Amplifier
RF2373PCK-414	Fully Assembled Evaluation Board with 5 Sample Parts

RF Micro Devices, Inc.
7628 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

Absolute Maximum Ratings

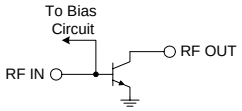
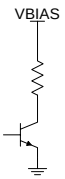
Parameter	Rating	Unit
Supply Voltage	-0.5 to +6.0	V_{DC}
Bias Voltage, V_{BIAS}	$\leq V_{CC}$	V_{DC}
Input RF Level	+15 (see note)	dBm
Current Drain, I_{CC}	32	mA
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

NOTE: Exceeding any one or a combination of the above maximum rating limits may cause permanent damage. Input RF transients to +15dBm will not harm the device. For sustained operation at inputs $\geq$+10dBm, a small dropping resistor of 10Ω is recommended in series with the V_{CC}.

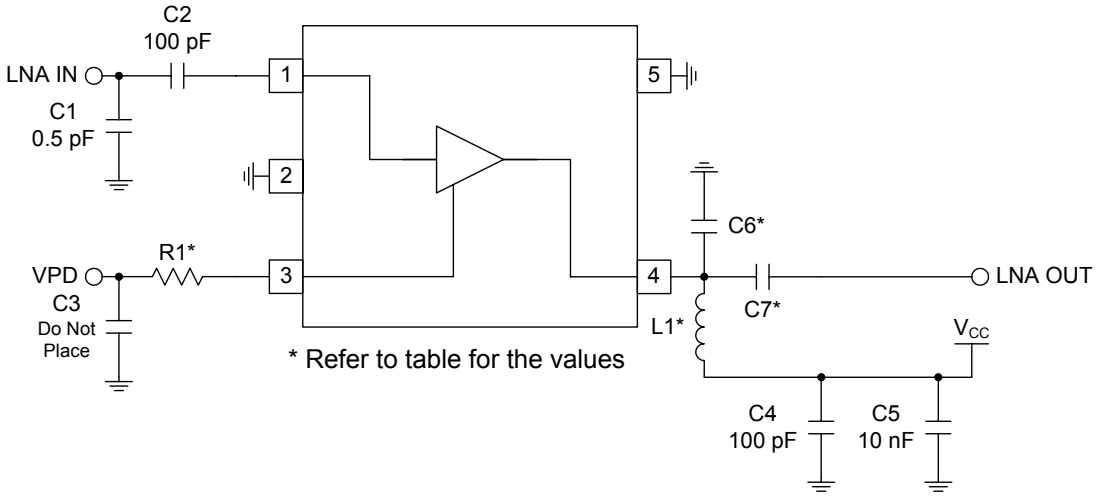
Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					25°C, V_{CC}=3.3V, at typical frequencies unless otherwise specified
Supply Voltage (V_{CC})	2.7	3.3	5.0	V	
Bias Voltage (V_{BIAS})	2.7	3.3	5.0	V	
RF Frequency Range		800 to 2500		MHz	
Power Down Current			10	μA	V_{BIAS}=0V
Isolation		23		dB	
Current Drain (LNA)	8	14	19	mA	
(Driver)	12	18	23	mA	
IP2		55		dBm	
Cellular Low Noise Amplifier					
Frequency	820	880	960	MHz	
Gain	19.5	21.5	23.5	dB	I_{CC}=10mA
Noise Figure		1.1	1.3	dB	
IIP3	-3	-1		dBm	
IP1dB	-13	-11		dBm	
Input VSWR		2.0	2.5		
Output VSWR		4.0	4.5		
GPS Low Noise Amplifier					
Frequency		1575		MHz	
Gain	17.0	19.0	21.0	dB	I_{CC}=10mA
Noise Figure		1.1	1.3	dB	
IIP3	3	5		dBm	
IP1dB	-7	-5		dBm	
Input VSWR		1.7	2.2		
Output VSWR		1.6	2.1		
PCS Low Noise Amplifier					
Frequency Range	1850	1920	1990	MHz	
Gain	16.0	18.0	20.0	dB	I_{CC}=10mA
Noise Figure		1.2	1.4	dB	
IIP3	4	6		dBm	
IP1dB	-7	-5		dBm	
Input VSWR		1.8	2.3		
Output VSWR		1.6	2.1		

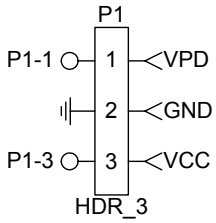
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
W-CDMA Low Noise Amplifier					
Frequency Range	1920	2045	2170	MHz	
Gain	15.5	17.5	19.5	dB	I_{CC}=10mA
Noise Figure		1.2	1.4	dB	
IIP3	6	8		dBm	
IP1dB	-3	-1		dBm	
Input VSWR		1.8	2.3		
Output VSWR		1.6	2.1		
WLAN Low Noise Amplifier					
Frequency	2400	2450	2500	MHz	
Gain	13.0	15.0	17.0	dB	I_{CC}=10mA
Noise Figure		1.3	1.5	dB	
IIP3	7.5	9.5		dBm	
P1dB	-5.5	-3.5		dBm	
Input VSWR		1.7	2.2		
Output VSWR		1.1	1.6		
Cellular Driver					
Frequency	820	880	960	MHz	
Gain	20.0	22.0	24.0	dB	I_{CC}=18mA
Noise Figure		1.2	1.4	dB	
OIP3	19	21		dBm	
OP1dB	9	11		dBm	
Input VSWR		2.0	2.5		
Output VSWR		4.0	4.5		
PCS Driver					
Frequency Range	1850	1920	1990	MHz	
Gain	16.5	18.5	20.5	dB	I_{CC}=18mA
Noise Figure		1.3	1.5	dB	
OIP3	21.5	23.5		dBm	
OP1dB	10.5	12.5		dBm	
Input VSWR		1.8	2.3		
Output VSWR		1.6	2.1		
W-CDMA Driver					
Frequency Range	1920	2045	2170	MHz	
Gain	15.0	17.5	20.0	dB	I_{CC}=18mA
Noise Figure		1.3	1.5	dB	
OIP3	23.5	25.5		dBm	
OP1dB	14.5	16.5		dBm	
Input VSWR		1.8	2.3		
Output VSWR		1.6	2.1		
WLAN Driver					
Frequency	2400	2450	2500	MHz	
Gain	13.5	15.5	17.5	dB	I_{CC}=18mA
Noise Figure		1.4	1.6	dB	
OIP3	23	25		dBm	
OP1dB	10	12		dBm	
Input VSWR		1.7	2.2		
Output VSWR		1.1	1.6		

Pin	Function	Description	Interface Schematic
1	RF IN	RF input pin. This pin is DC coupled.	
2	GND1	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
3	BIAS	This pin is used to control the bias current. An external resistor can be used to set the bias current for any V_{BIAS} voltage. See table with evaluation board schematic.	
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 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	
5	GND2	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	

Evaluation Board Schematic



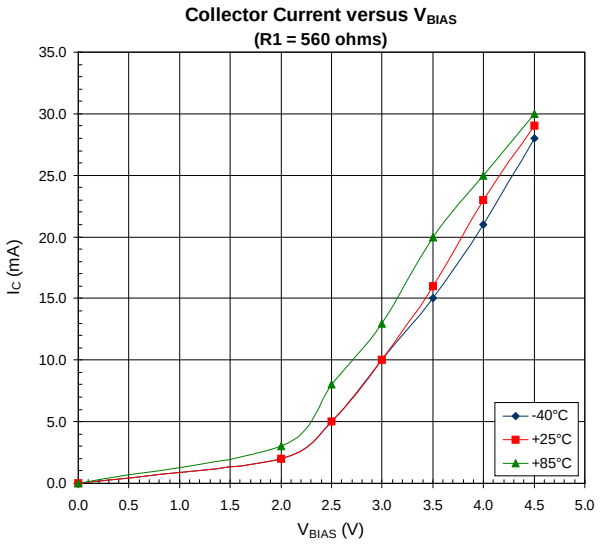
Component	Cellular 900 MHz	GPS 1575 MHz	PCS 1950 MHz	W-CDMA 2140 MHz	WLAN 2450 MHz
L1 (nH)	3.9	2.7	2.7	2.7	2.2
C6 (pF)	4.3	1.5	0.5	DNP	DNP
C7 (pF)	2.0	1.2	1.0	1.0	1.0



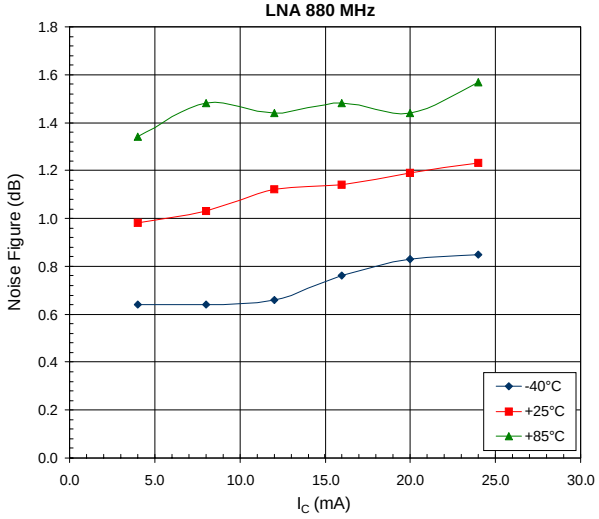
V_{PD}	I_{CC} R1 = 300 Ω	I_{CC} R1 = 430 Ω	I_{CC} R1 = 560Ω	I_{CC} R1 = 1 kΩ	I_{CC} R1 = 1.5 kΩ
2.7	12	9	7	5	4
3.0	16	12	9	6	5
3.3	20	15	11	7	5
3.6	25	19	14	8	6
4.0	31	24	18	10	7
4.5	Over Limit	31	23	13	8
5.0	Over Limit	Over Limit	29	16	10

Note: V_{CC} set to 3.3 V. I_{CC} only slightly dependent on V_{CC}.

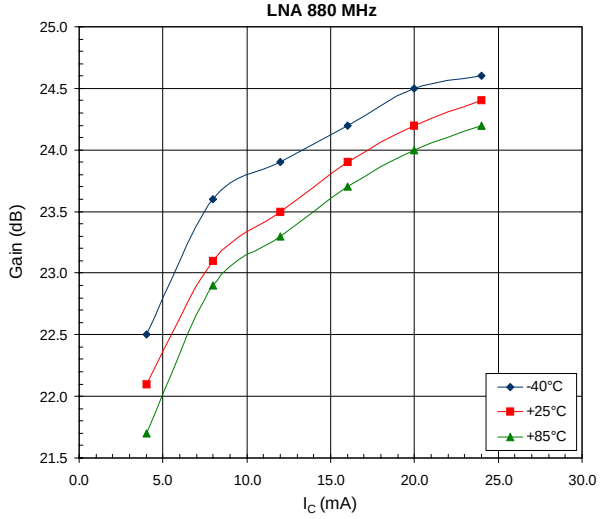
This information pertains to the following charts.
Test condition unless otherwise specified: V_{CC}=3.3V, use evaluation board for corresponding frequencies.



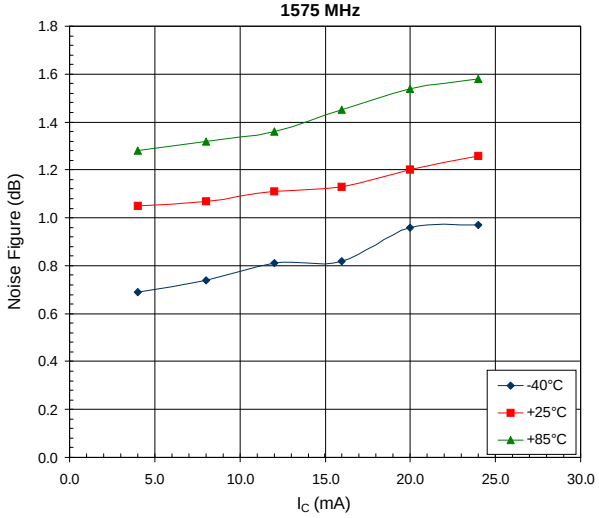
Noise Figure versus Collector Current
LNA 880 MHz



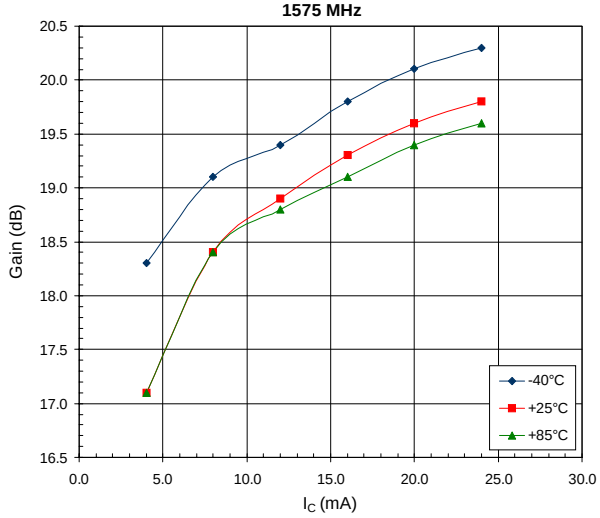
Gain versus Collector Current
LNA 880 MHz



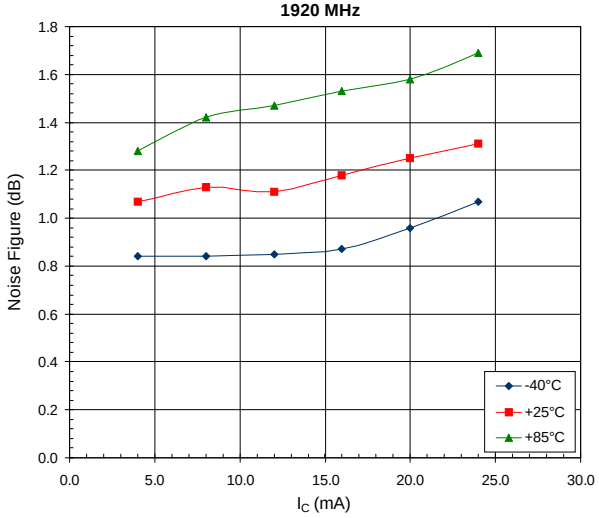
Noise Figure versus Collector Current
1575 MHz



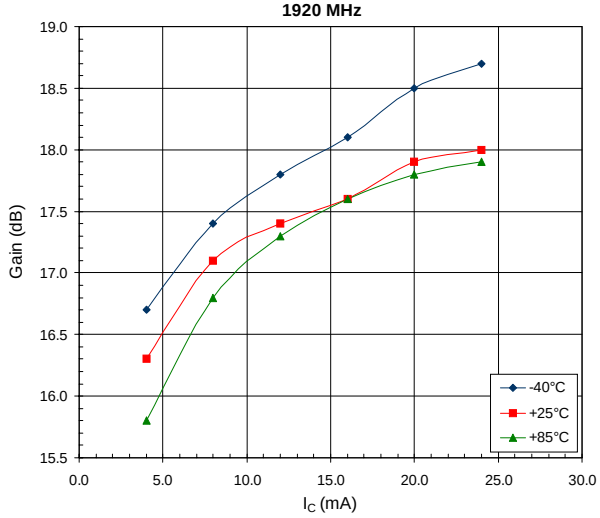
Gain versus Collector Current
1575 MHz

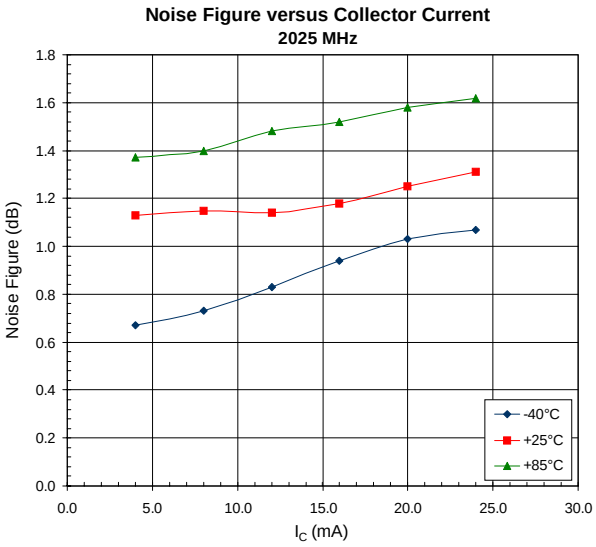


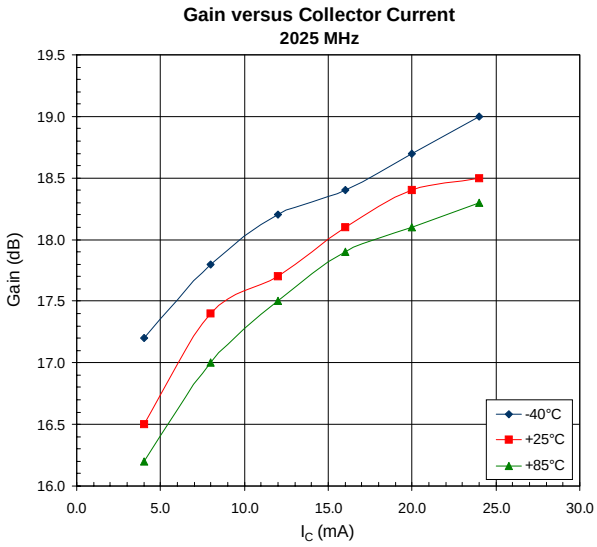
Noise Figure versus Collector Current
1920 MHz

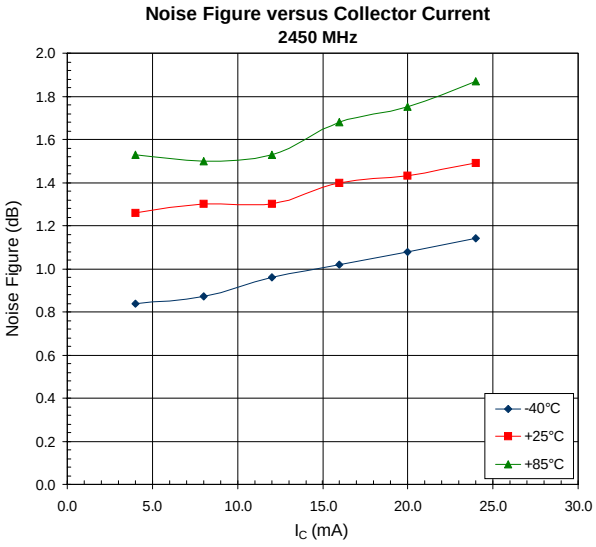


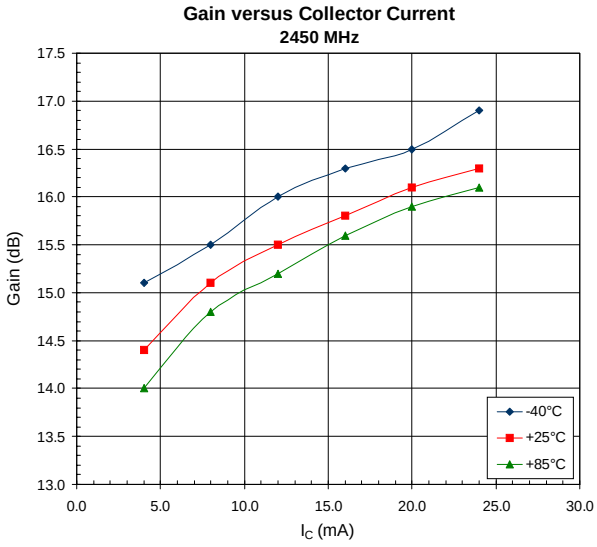
Gain versus Collector Current
1920 MHz




Noise Figure versus Collector Current
2025 MHz
Noise Figure (dB)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
I_C (mA)
-40°C
+25°C
+85°C


Gain versus Collector Current
2025 MHz
Gain (dB)
19.5
19.0
18.5
18.0
17.5
17.0
16.5
16.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
I_C (mA)
-40°C
+25°C
+85°C


Noise Figure versus Collector Current
2450 MHz
Noise Figure (dB)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
I_C (mA)
-40°C
+25°C
+85°C


Gain versus Collector Current
2450 MHz
Gain (dB)
17.5
17.0
16.5
16.0
15.5
15.0
14.5
14.0
13.5
13.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
I_C (mA)
-40°C
+25°C
+85°C