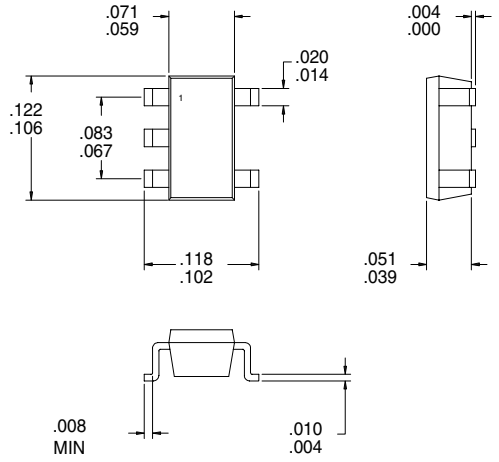
Typical Applications

- Broadband, Low Noise Gain Blocks
- IF or RF Buffer Amplifiers
- Driver Stage for Power Amplifiers
- Final PA for Low Power Applications
- Broadband Test Equipment

Product Description

The RF2333 is a general purpose, low cost RF amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as an easily-cascadable 50Ω gain block. Applications include IF and RF amplification in wireless voice and data communication products operating in frequency bands up to 6000MHz. The device is self-contained with 50Ω input and output impedances and requires only two external DC biasing elements to operate as specified. The RF2333 is available in a very small industry-standard SOT-23 5-lead surface mount package, enabling compact designs which conserve board space.



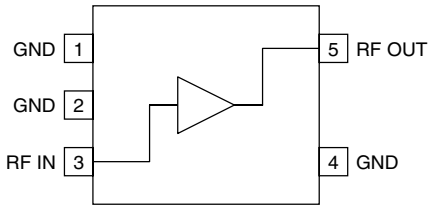
Package Style: SOT-23-5

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS

Features

- DC to 6000MHz Operation
- Internally matched Input and Output
- 10dB Small Signal Gain
- +34dBm Output IP3
- +18.5dBm Output Power
- Good Gain Flatness



Functional Block Diagram

Ordering Information

RF2333	General Purpose Amplifier
RF2333 PCBA	Fully Assembled Evaluation Board

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Current	120	mA
Input RF Power	+20	dBm
Operating Ambient Temperature	-40 to +65	°C
Storage Temperature	-60 to +150	°C

Caution! ESD sensitive device.

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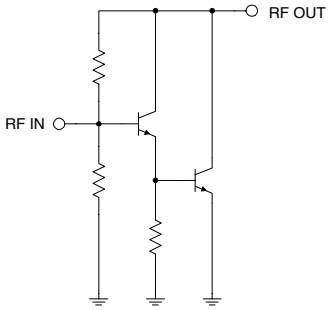
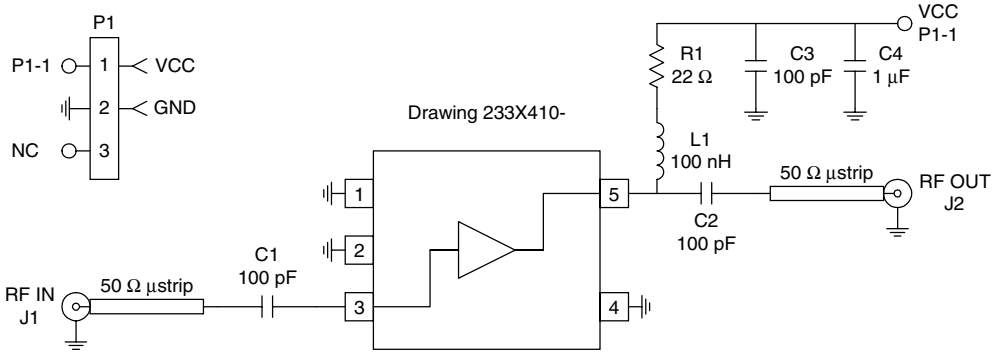
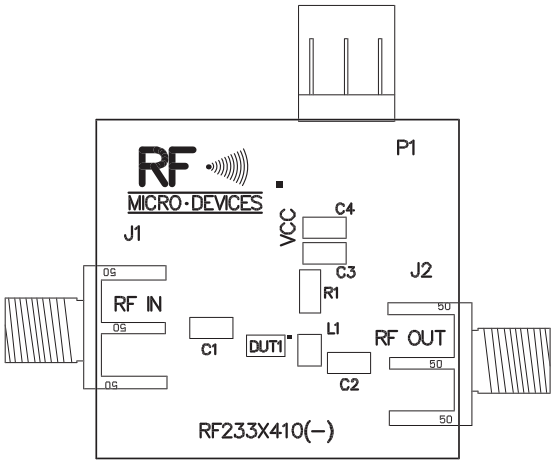
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=25 °C, V_D=5.5V, I_{CC}=70mA
Frequency Range		DC to 6000		MHz	
3dB Bandwidth		6		GHz	
Gain		11.2		dB	Freq=100MHz
		11		dB	Freq=1000MHz
		10.4		dB	Freq=2000MHz
		10.2		dB	Freq=3000MHz
		10			Freq=4000MHz
		9.2			Freq=5000MHz
		8.3			Freq=6000MHz
Gain Flatness		±0.4		dB	100MHz to 2000MHz
Noise Figure		8.2		dB	Freq=2000MHz
Input VSWR		1.7:1			In a 50Ω system, DC to 4000MHz
Output VSWR		1.7:1			In a 50Ω system, DC to 4000MHz
Output IP_3		+34.5		dBm	Freq=1000MHz±50kHz, P_{TONE}=-10dBm
Output P_{1dB}		+18.5		dBm	Freq=1000MHz
Reverse Isolation		17		dB	Freq=2000MHz
Power Supply					With 22Ω bias resistor
Device Operating Voltage	5.0	5.5	6.0	V	At pin 3 with I_{CC}=70mA
Operating Current		70		mA	

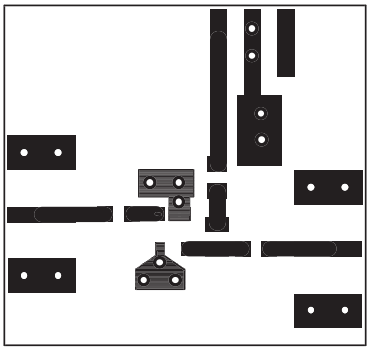
Pin	Function	Description	Interface Schematic
1	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
2	GND	Same as pin 1.	
3	RF IN	RF input pin. This pin is NOT internally DC blocked. A DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. DC coupling of the input is not allowed, because this will override the internal feedback loop and cause temperature instability.	
4	GND	Same as pin 1.	
5	RF OUT	RF output and bias pin. Biasing is accomplished with an external series resistor and choke inductor to V_{CC}. The resistor is selected to set the DC current into this pin to a desired level. The resistor value is determined by the following equation: $$R = \frac{(V_{SUPPLY} - V_{DEVICE})}{I_{CC}}$$ Care should also be taken in the resistor selection to **ensure that the current into the part never exceeds 120 mA over the planned operating temperature**. This means that a resistor between the supply and this pin is always required, even if a supply near 5.5V is available, to provide DC feedback to prevent thermal runaway. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. The supply side of the bias network should also be well bypassed.	

Evaluation Board Schematic

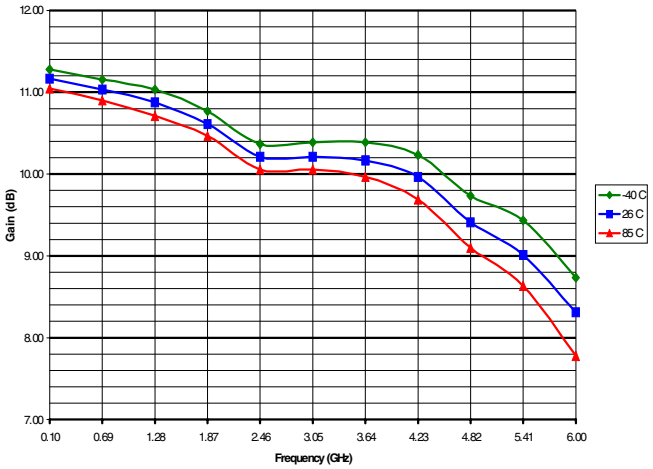


Evaluation Board Layout
Board Size 1” x 1”

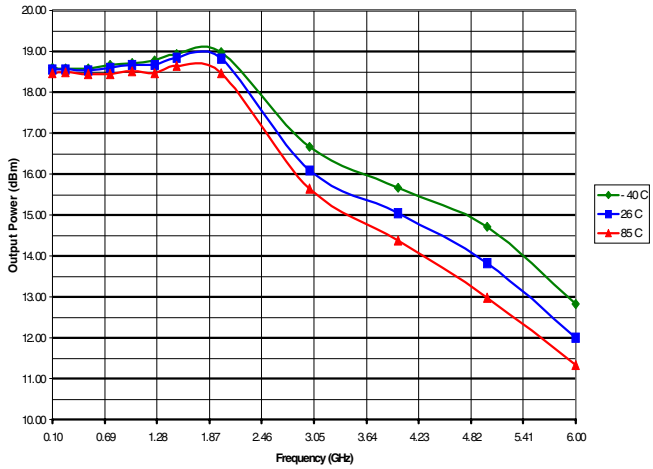




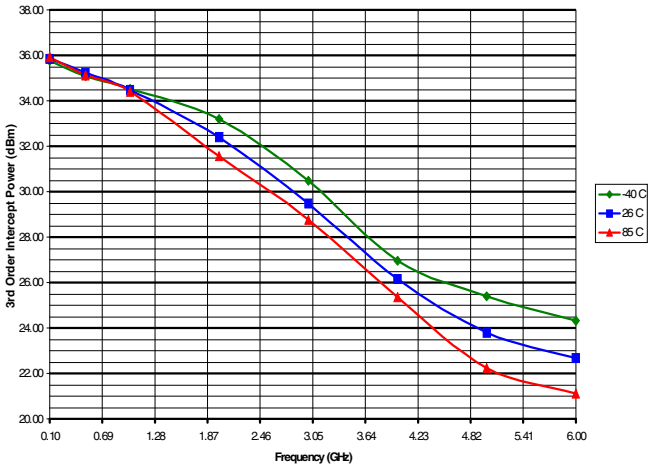
RF2333 Gain vs. Frequency across Temperature
Icc = 70 mA



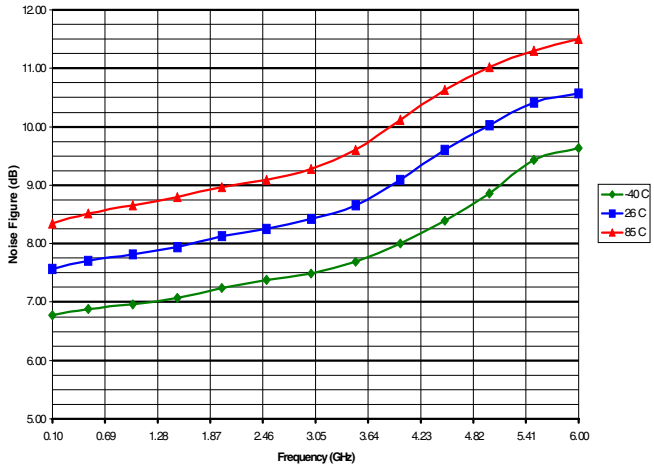
RF2333 Output P1dB vs. Frequency across Temperature
Icc = 70 mA



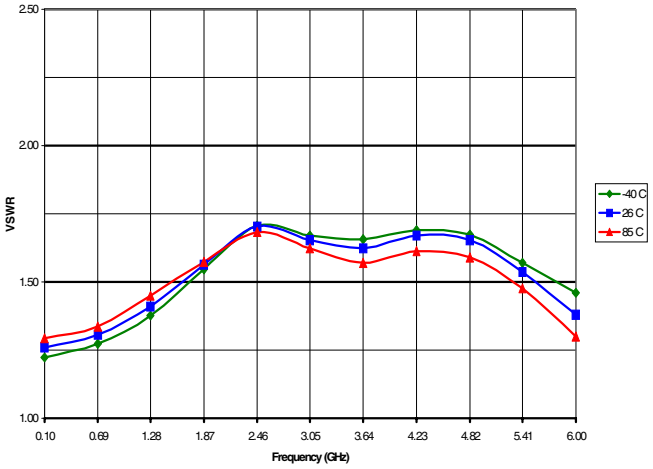
RF2333 Output IP3 vs. Frequency across Temperature
Icc = 70 mA



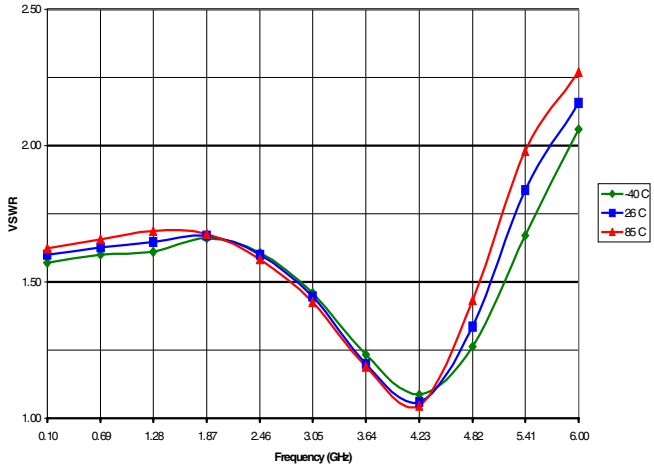
RF2333 Noise Figure vs. Frequency across Temperature
Icc = 70 mA

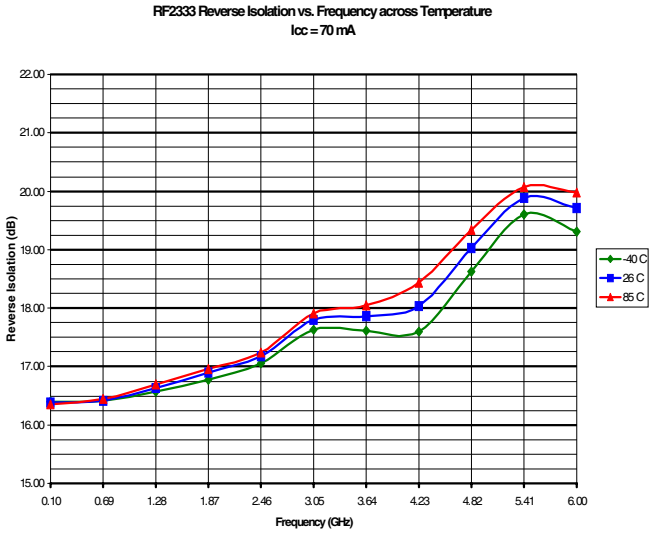


RF2333 Input VSWR vs. Frequency across Temperature
Icc = 70 mA



RF2333 Output VSWR vs. Frequency across Temperature
Icc = 70 mA




RF2333 Reverse Isolation vs. Frequency across Temperature
Icc = 70 mA
Reverse Isolation (dB)
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
0.10
0.69
1.28
1.87
2.46
3.05
3.64
4.23
4.82
5.41
6.00
Frequency (GHz)
-40 C
25 C
85 C