

## Technical Report TR103

**Device:** BFP740  
**Application:** WiMax LNA for 2.3 – 2.7 GHz  
**Revision:** Rev. 1.0  
**Date:** 2008-Dec-03

RF and Protection Devices



Never stop thinking

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## 1. Overview

**Infineon Device:** BFP740 Silicon Germanium RF Bipolar Transistor

**Application:** WiMax LNA 2.3 – 2.7 GHz

**PCB Marking:** Ver. 740-080929 Rev A

## 2. Summary of Measurement Results

**Table 2-1: Summary of Measurement Results**

Parameter	Symbol	Value	Unit	Note/Test Condition
Frequencies	Freq	2.3 ... 2.7	GHz	
DC Voltage	Vcc	3.3	V	
DC Current	Icc	10	mA	
Gain	G	18.4	dB	Power @ port1= -30 dBm
Noise Figure	NF	1.0	dB	Including SMA connectors and PCB losses of 0.1dB
Input Return Loss	RLin	11.3	dB	
Output Return Loss	RLout	11.2	dB	
Reverse Isolation	IRev	25	dB	Power @ port2 = -10 dBm
Input P1dB	IP1dB	-13.3	dBm	
Output P1dB	OP1dB	4.1	dBm	
Input IP3	IIP3	3.4	dBm	Power @ Input = -30 dBm $\Delta f = 1$ MHz
Output IP3	OIP3	22	dBm	
Stability factor	k	> 1		Stability measured from 100MHz to 20GHz
Max RF input Power	Pin	10	dBm	With CW power tested on BFP740 transistor for 1000hr.

### 3. Description:

This report presents the measurement results of the Low Noise Amplifier using the SiGe:C bipolar transistor BFP740 from Infineon technologies with microstrip line on emitter as emitter degeneration inductance for the 2.3 – 2.7 GHz WiMax application. The LNA brings a gain of 18.4dB on the frequency band from 2.3GHz to 2.7GHz with a noise figure of 1.0 dB (including the SMA connector and PCB losses of 0.1dB). Furthermore, this device provides an unconditionally stability from 100MHz to 20GHz. With a current of 10mA, this circuit achieves quite high input P1dB of -13.3 dBm and high input IP3 of +3.4 dBm.

By using microstrip lines between the emitter pins of the BFP740 and the ground as emitter degeneration inductance provides an optimum input and output matching. Anyway, we can reach a better value of the stability.

#### 4. Schematics:

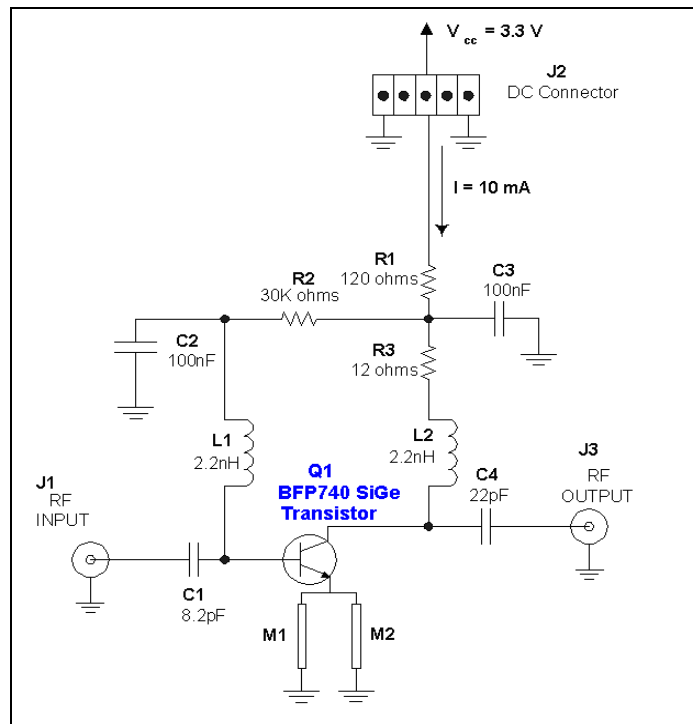


Figure 4-1: Schematics of the LNA using the BFP740

Table 4-1: Bill of Materials

Symbol	Value	Unit	Size	Manufacturer	Comment
C1	8.2	pF	0402	various	Input DC block, input matching
C2	100	nF	0402	various	RF bypass/ RF block
C3	100	nF	0402	various	RF bypass/ RF block
C4	22	pF	0402	various	Output DC block, Output matching
L1	2.2	nH	0402	Murata LQG15HS	DC feed, input matching
L2	2.2	nH	0402	Murata LQG15HS	DC feed to collector, output matching
R1	120	$\Omega$	0402	various	DC bias, drop voltage for collector
R2	30	k $\Omega$	0402	various	DC bias for base
R3	12	$\Omega$	0402	various	Stability (below 2Ghz)
Q1			SOT343	Infineon	BFP740 SiGe transistor
M1	0.2x0.9	mm <sup>2</sup>			(microstrip line) width x length in mm
M2	0.2x0.9	mm <sup>2</sup>			(microstrip line) width x length in mm

## 5. Measured Graphs

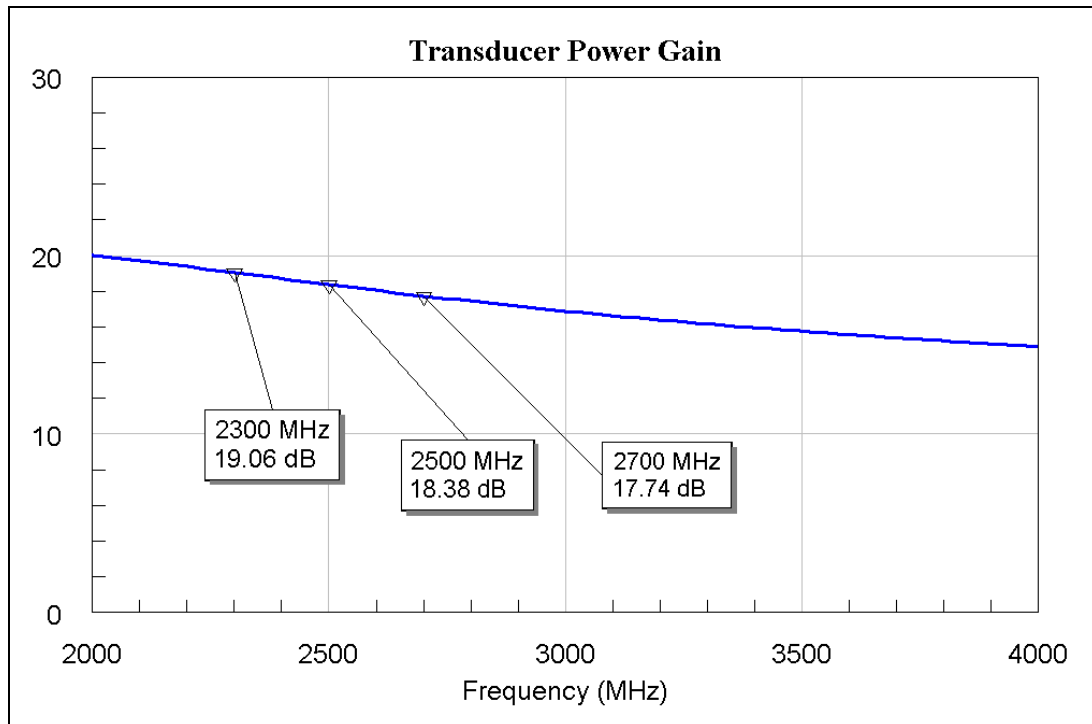


Figure 5-1: Power gain of BFP740

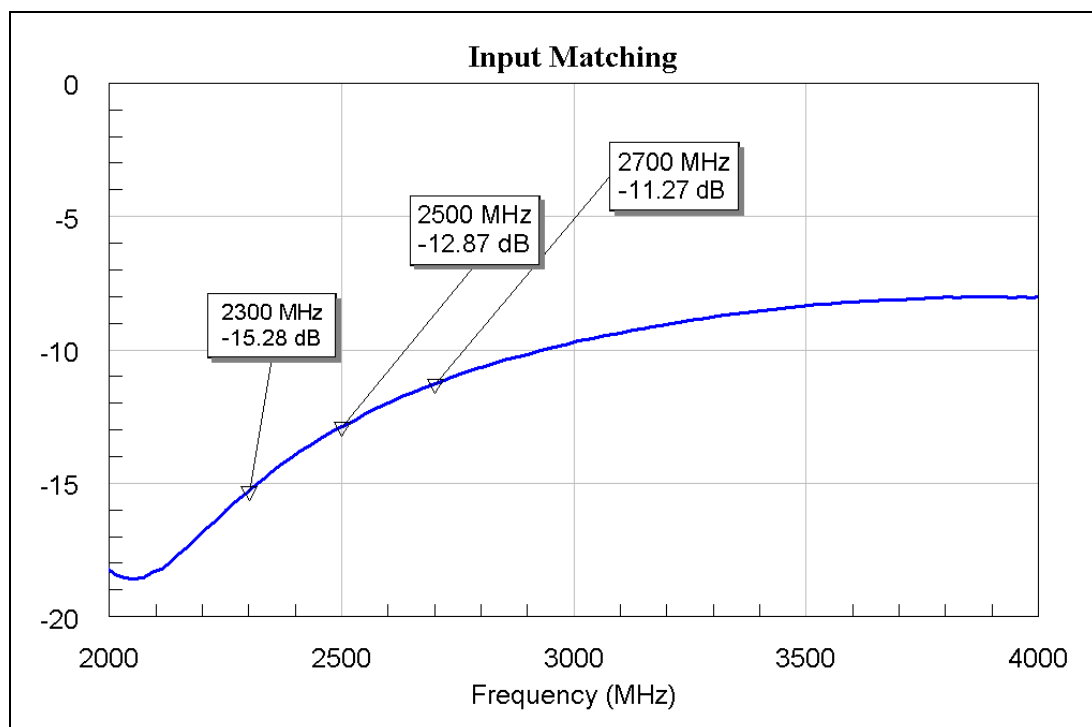


Figure 5-2: Input matching of BFP740

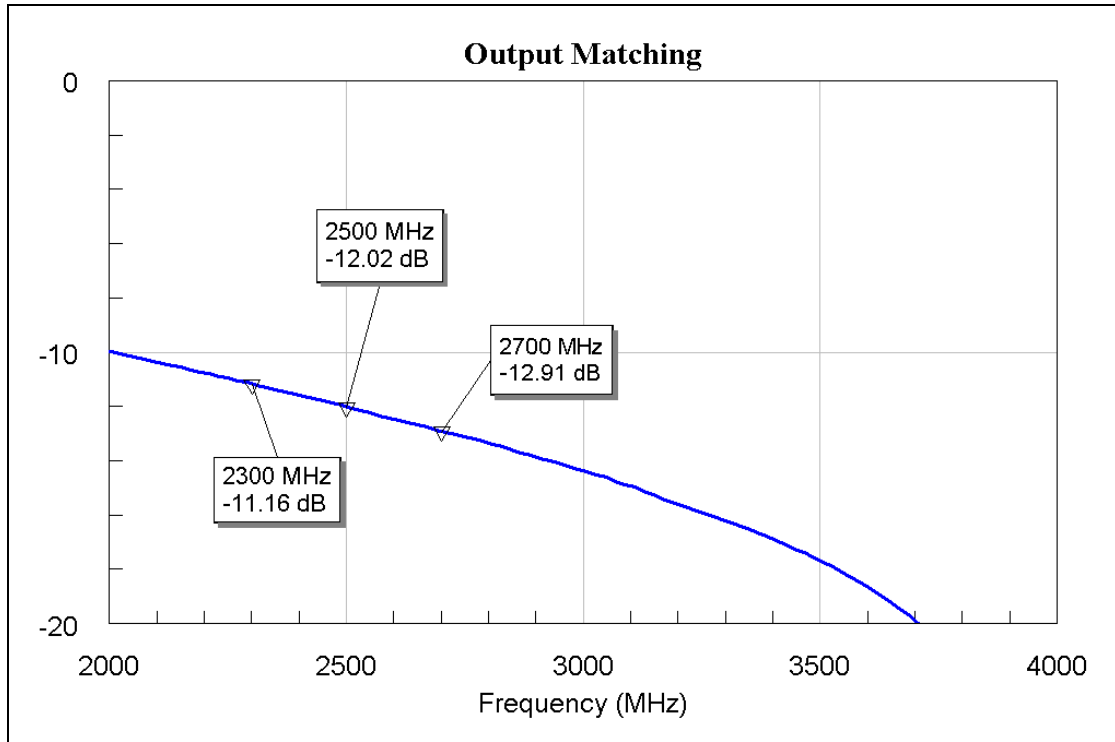


Figure 5-3: Output matching of BFP740

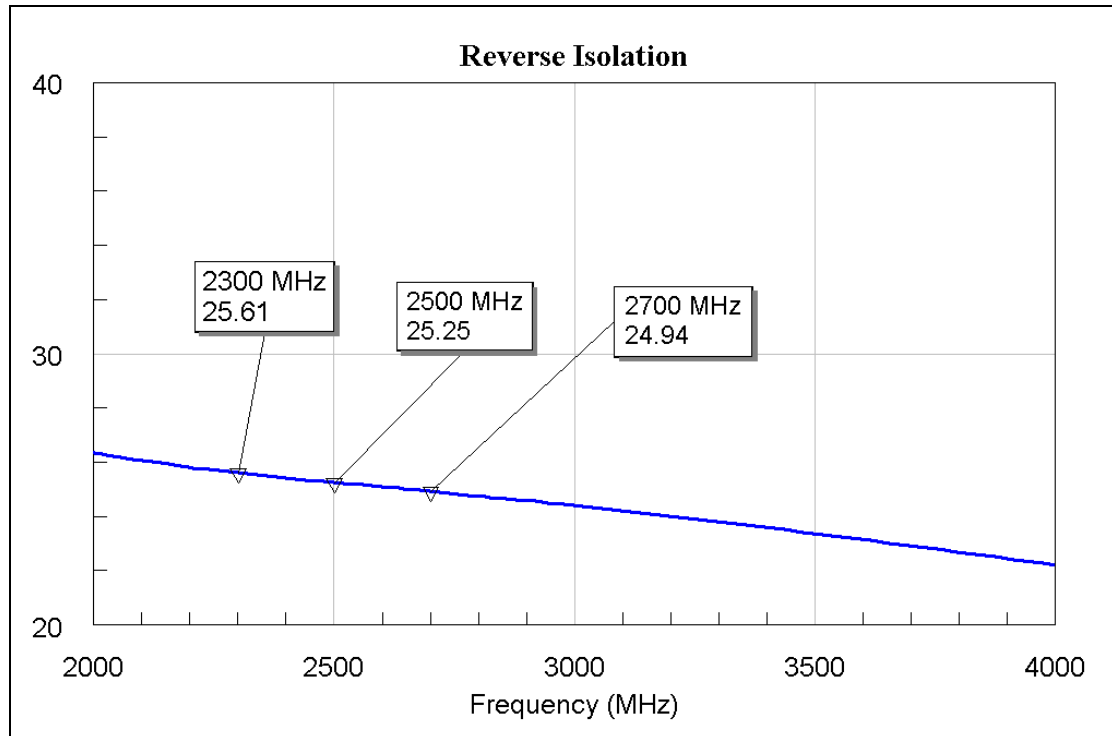


Figure 5-4: Reverse Isolation of BFP740

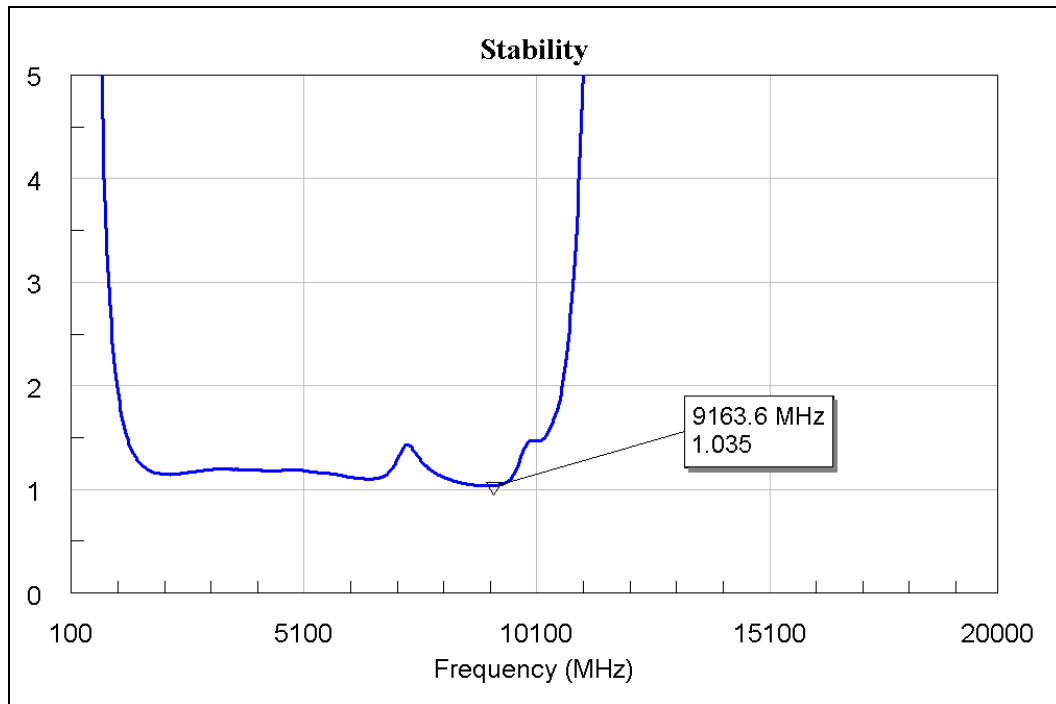


Figure 5-5: Stability Factor of BFP740



## 6. Picture of the board and Layout information

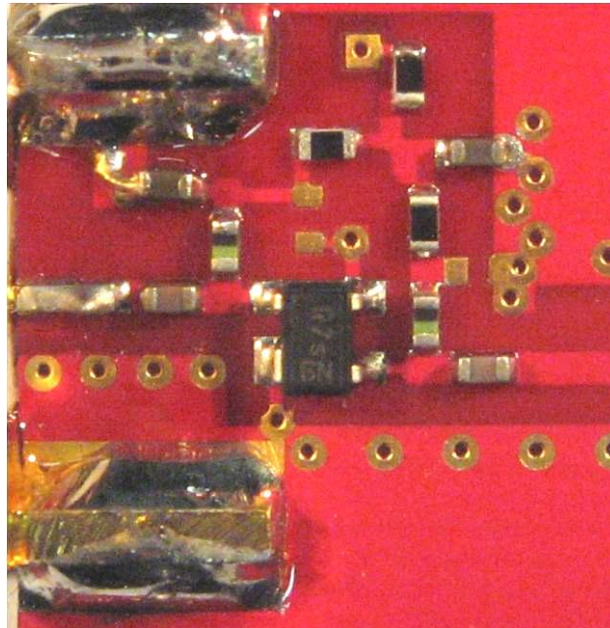


Figure 6-1: Photo of the LNA circuit (PCB Marking: 740-080929 Rev A)

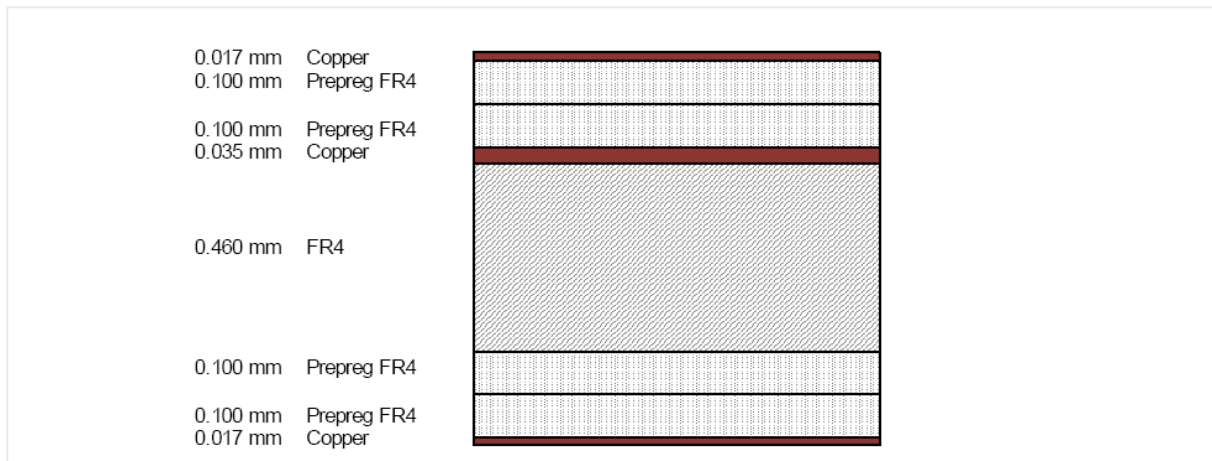


Figure 6-2: Layout Information