

# Technical Report TR104

**Device:** BFP740

**Application:** LNA for 3.5 GHz WiMax Application

**Revision:** Rev. 1.0

**Date:** 2008-Nov-21

RF and Protection Devices



**Never stop thinking**

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## 1. Overview

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

**Application:** 3.5 GHz WiMax LNA

**PCB Marking:** Ver. 740-081009 Rev A

## 2. Summary of Measurement Results

**Table 2-1: Summary of Measurement Results @ 3.5GHz**

Parameter	Symbol	Value	Unit	Note/Test Condition
Frequencies	Freq	3.3 ... 3.7	GHz	
DC Voltage	Vcc	3.3	V	
DC Current	Icc	15	mA	
Gain	G	15.4	dB	Power @ port1: -30dBm
Noise Figure	NF	0.95	dB	Including SMA connectors and PCB losses of 0.1dB
Input Return Loss	RLin	10	dB	
Output Return Loss	RLout	11.5	dB	
Reverse Isolation	IRev	27.1	dB	Power @ port2: -10dBm
Input P1dB	IP1dB	-10.5	dBm	
Output P1dB	OP1dB	3.9	dBm	
Input IP3	IIP3	3.1	dBm	Power @ Input -30dBm $\Delta f = 1\text{MHz}$
Output IP3	OIP3	18.5	dBm	
Stability factor	k	> 1.15		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 transistor BFP740 from Infineon Technologies for the 3.5GHz WiMax application.

The LNA brings a gain of 15dB on the frequency band from 3.3GHz to 3.7GHz with a noise figure of 0.95dB (including the SMA connectors and PCB losses of 0.1dB).

Furthermore, this device provides an unconditionally stability from 200MHz to 20GHz. The circuit is matched at input and output, and presents an input return loss of 10dB, and an output return loss of 11.5dB.

At the working frequency of 3.5GHz, using two tones spaced from 1MHz, the output third intercept point reaches 18.5dBm. Besides, we obtain a -1dB compression point of -10.5dBm at the input.

### 4. Schematics:

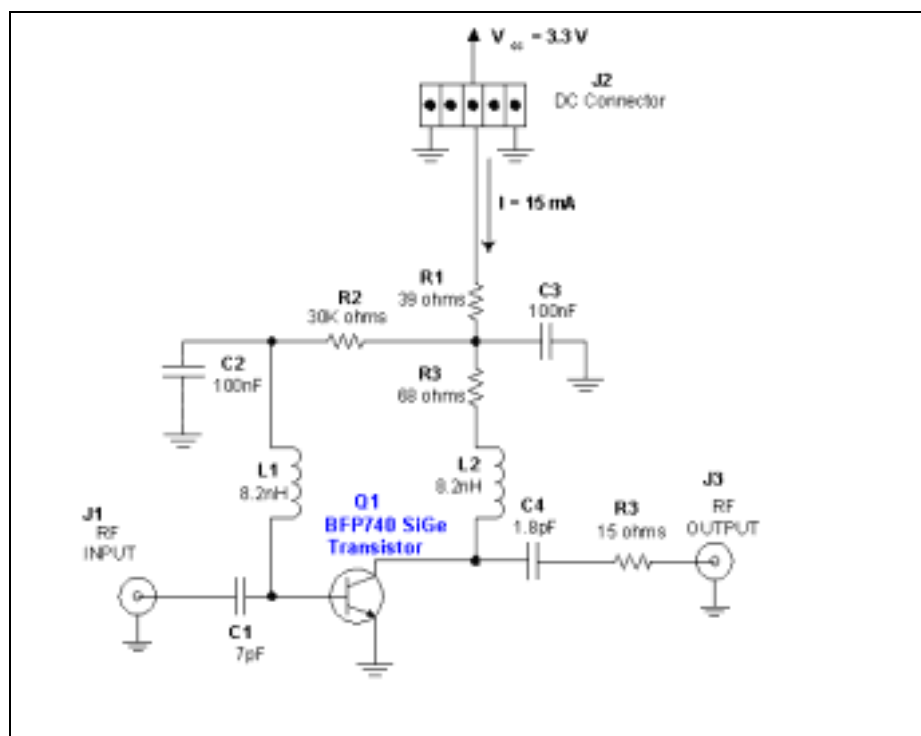


Figure 4-1: Schematics of the LNA using the BFP740

**Table 4-1: Bill of Materials**

Symbol	Value	Unit	Size	Manufacturer	Comment
C1	7	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	1.8	pF	0402	various	Output DC block, Output matching
L1	8.2	nH	0402	Murata LQG15H	DC feed, input matching
L2	8.2	nH	0402	Murata LQG15H	DC feed to collector, output matching
R1	39	$\Omega$	0402	various	DC bias, drop voltage for collector
R2	30	k $\Omega$	0402	various	DC bias for base
R3	68	$\Omega$	0402	various	Stability (below 2Ghz)
R4	15	$\Omega$	0402	various	Stability , Input/Output matching
Q1			SOT343	Infineon	BFP740 SiGe transistor

## 5. Measured Graphs

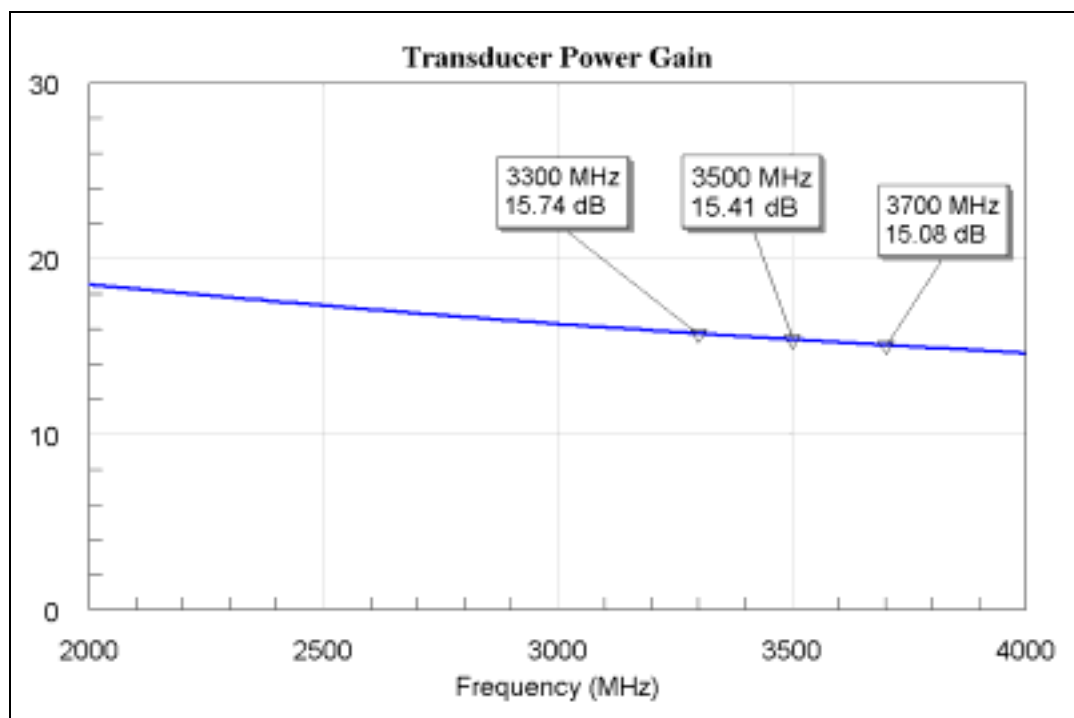


Figure 5-1: Power gain of BFP740

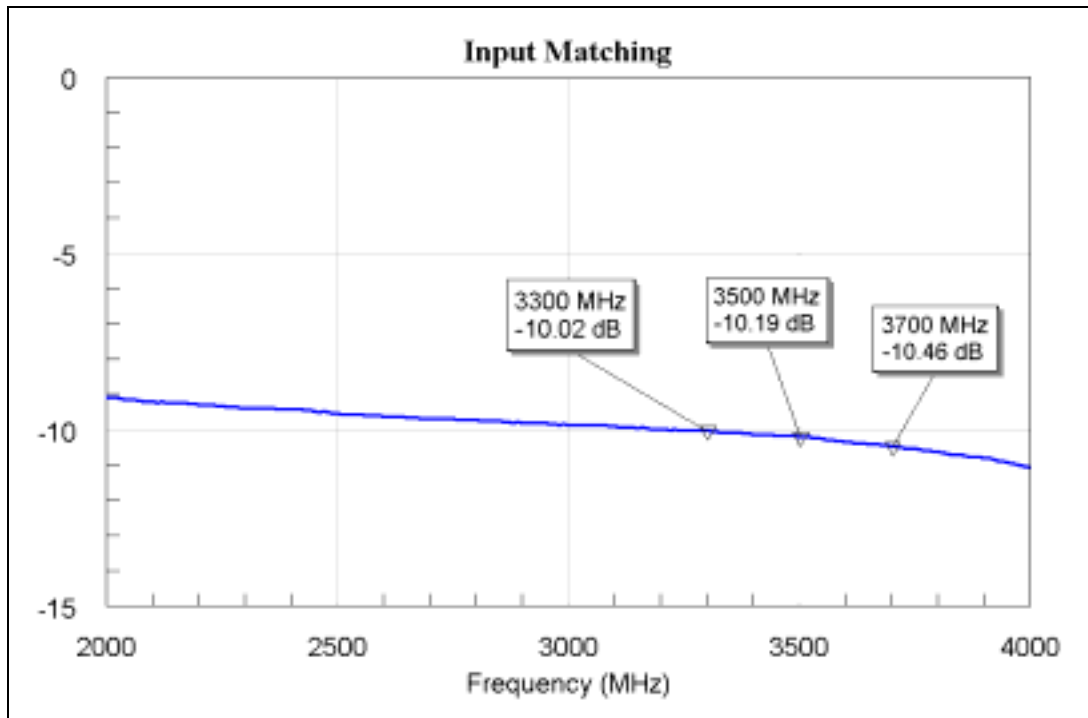


Figure 5-2: Input matching of BFP740

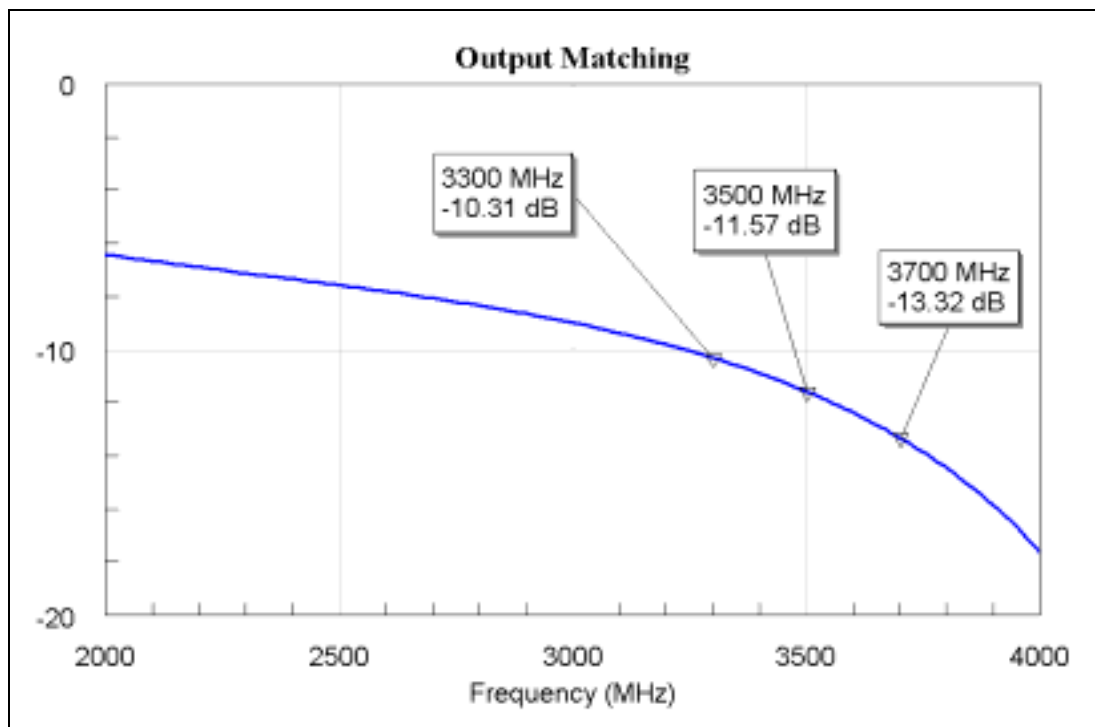


Figure 5-3: Output matching of BFP740

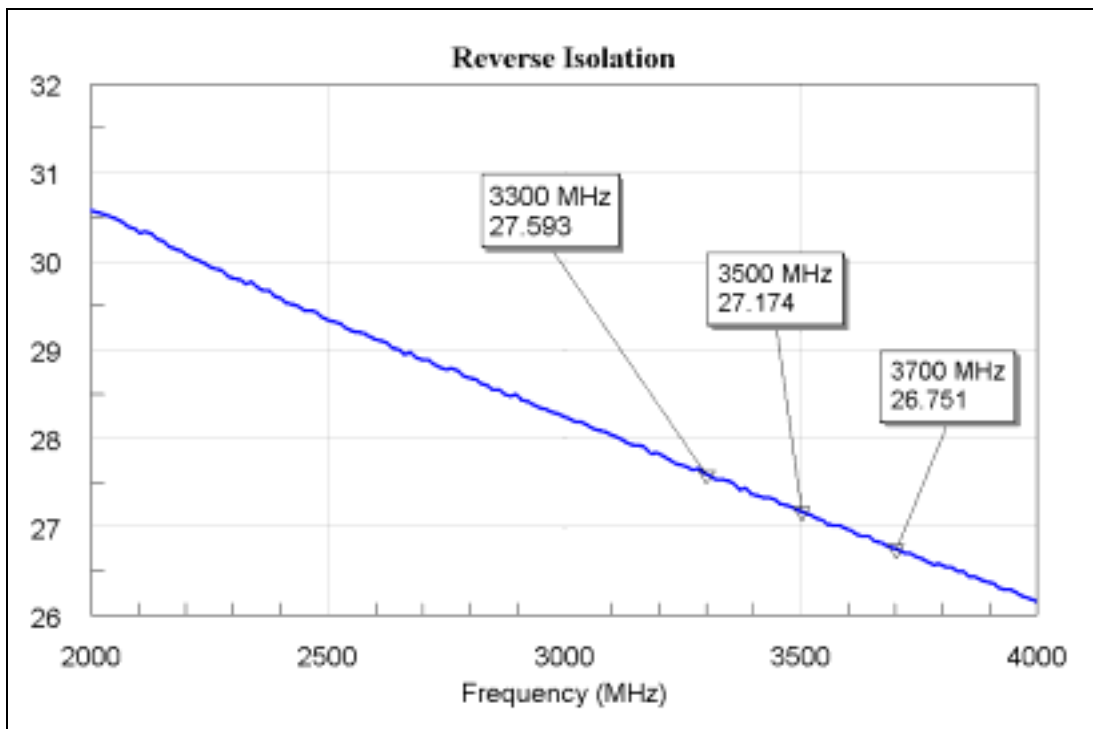


Figure 5-4: Reverse Isolation of BFP740

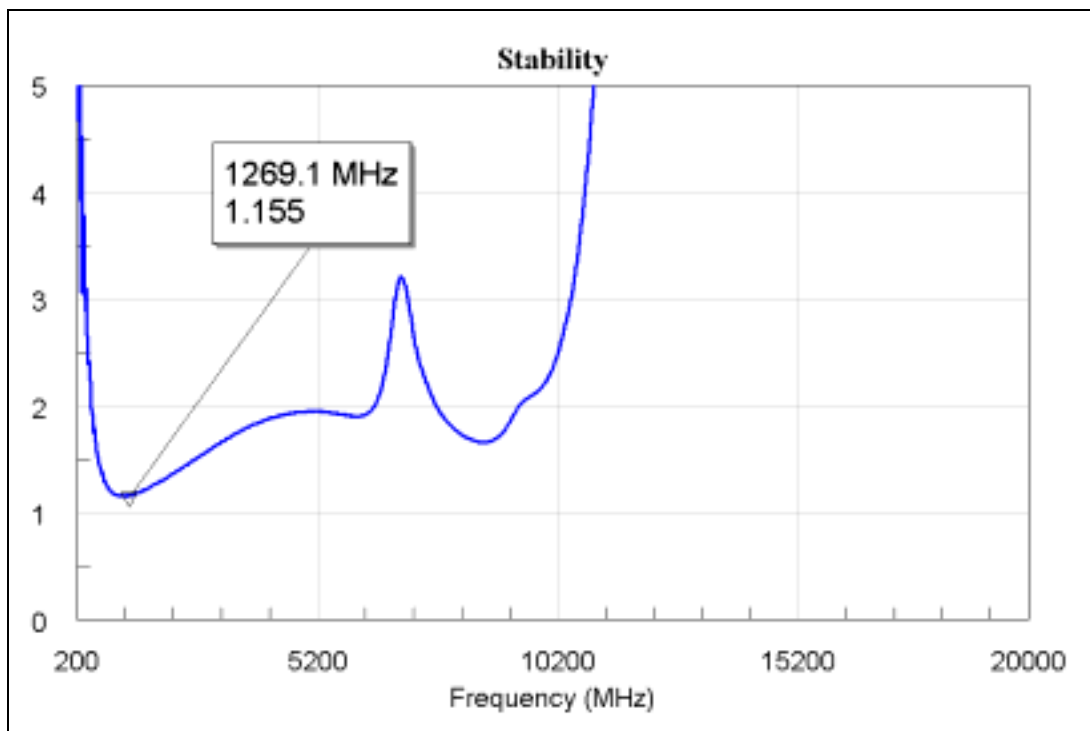


Figure 5-5: Stability Factor of BFP740

## 6. Picture of the board and Layout information

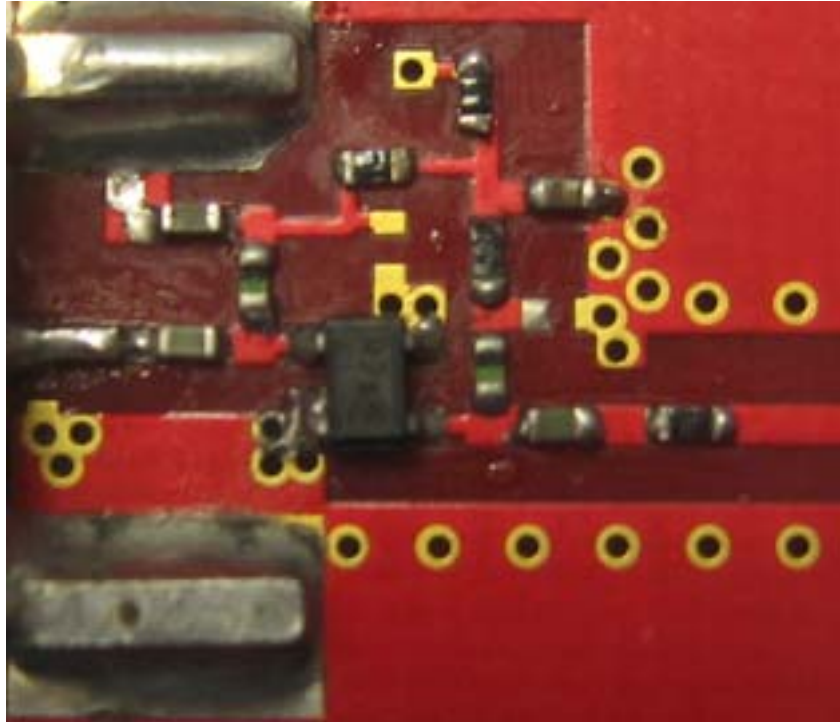


Figure 6-1: Photo of the LNA circuit

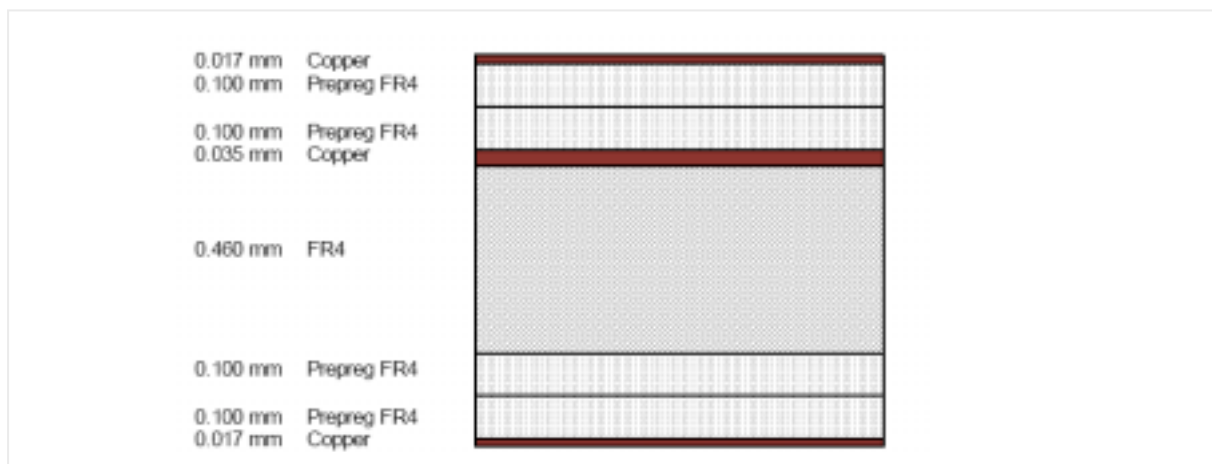


Figure 6-2: Layout Information

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