National Semiconductor

ADVANCE INFORMATION

LMX2218
0.1 GHz to 2.5 GHz Low Noise Amplifier/Mixer for RF Personal Communications

General Description

The LMX2218 is a monolithic, integrated low noise amplifier (LNA) and mixer suitable as a first stage amplifier and downconverter for RF receiver applications. The wideband operating capabilities of the LMX2218 allow it to function over frequencies from 0.1 GHz to 2.5 GHz. It is fabricated using National Semiconductor's Advanced BiCMOS (ABiC V) process (f_T = 14 GHz).

All input and output ports of the LMX2218 are single-ended. The LNA input and output along with the Mixer ports are designed to interface to a 50Ω system. The only additional RF support circuitry required are DC blocking capacitors, elimininating the many problems associated with component tolerences in discrete designs. The LMX2218 operates over a wide range of supply voltages.

The low noise amplifier produces very flat gain over the entire operating range. The single-balanced, mixer provides low noise figure that is vital for modern communications systems. A power down feature is implemented on the LMX2218 that is especially useful for standby operation common in Time Division Multiple Access (TDMA) and Time Division Duplex (TDD) systems.

The LMX2218 is available in a narrow-body 16-pin surface mount plastic package.

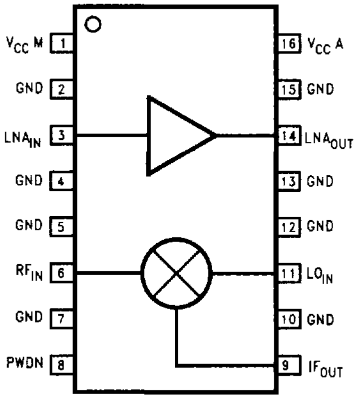
Features

- Wideband RF operation from 0.1 GHz to 2.5 GHz
- Cascaded downconverter: Gain 22 dB
- Typical LNA Noise Figure 3.0 dB at 2 GHz
- LNA input and output ports matched to 50Ω
- Mixer input ports matched to 50Ω
- Power down feature for low power consumption

Applications

- Digital European Cordless Telecommunications (DECT)
- Global System for Mobiles (GSM)
- Portable wireless communications (PCS1900/PCN, cordless)
- Wireless local area networks (WLANs)
- Digital Cellular Telephone Systems
- Other wireless communications systems

Functional Block/Pin Diagram



TL/W/12819-1

Order Number LMX2218M
See NS Package Number M16A

Pin Description

Pin No.	Pin Name	I/O	Description
1	V_{CC} M	I	Voltage supply for the mixer. The input voltage level to this pin should be a DC Voltage ranging from 2.85V to 5.00V.
2	GND		Ground
3	LNA_{IN}	I	RF input signal to the LNA. External DC blocking capacitor is required.
4	GND		Ground
5	GND		Ground
6	RF_{IN}	I	RF input to the mixer. The RF signal to be down converted is connected to this pin. External DC blocking capacitor is required.
7	GND		Ground
8	PWDN	I	Power down signal pin. Both the LNA and mixer are powered down when a HIGH level is applied to this pin (V_{IH}).
9	IF_{OUT}	O	IF output signal of the mixer. External DC blocking capacitor is required.
10	GND		Ground
11	LO_{IN}	I	Local oscillator input signal to the mixer. External DC blocking capacitor is required.
12	GND		Ground
13	GND		Ground
14	LNA_{OUT}	O	Output of the LNA. This pin outputs the amplified RF signal. External DC blocking capacitor is required.
15	GND		Ground
16	V_{CC} A	I	LNA supply Voltage. DC Voltage ranging from 2.85V to 5.00V.

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	6.5V
Storage Temperature (T_S)	−65°C to +150°C
Operating Temperature (T_O)	−40°C to +85°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	2.85V–5.00V
Operating Temperature (T_A)	−10°C to +70°C
RF_{IN}	0.1 GHz to 2.5 GHz
LO_{IN}	0.1 GHz to 2.5 GHz

Electrical Characteristics: LNA

(V_{CC} = +3.0V ±5%, T_A = 25°C, Z_o = 50Ω and f_{IN} = 2.0 GHz @ −30 dBm unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
I_{CC}	Supply Current	In Operation		7.0		mA
$I_{CC\text{-}PWDN}$	Supply Current	In Power Down Mode		1		μA
G	Gain			10		dB
P_{1dB}	Output 1 dB Compression Point			−3.0		dBm
OIP3	Output 3rd Order Intercept Point			7.0		dBm
NF	Single Side Band Noise Figure			3.0		dB
RL_{IN}	Input Return Loss			15		dB
RL_{OUT}	Output Return Loss			11		dB

Electrical Characteristics: Mixer

(V_{CC} = +3.0V ±5%, T_A = 25°C, Z_o = 50Ω, f_{RF} = 2.0 GHz @ −30 dBm, f_{LO} = 1.89 GHz @ 0 dBm; f_{IF} = 110 MHz unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
I_{CC}	Supply Current	In Operation		9.0		mA
$I_{CC\text{-}PWDN}$	Supply Current	In Power Down Mode		1		μA
G_C	Conversion Gain (Single Side Band)			12		dB
P_{1dB}	Output 1 dB Compression Point			−9.0		dBm
OIP3	Output Third Order Intercept Point			0.0		dBm
SSB NF	Single Side Band Noise Figure			14		dB
DSB NF	Double Side Band Noise Figure			11		dB
LO-RF	LO to RF Isolation			20		dB
RF RL	RF Return Loss			15		dB
LO RL	LO Return Loss			15		dB
IF RL	IF Return Loss			15		dB

Electrical Characteristics: Power Down

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IH}	High Level Input Voltage		V_{CC} − 0.8			V
V_{IL}	Low Level Input Voltage				0.8	V
I_{IH}	High Level Input Current	V_{IH} = V_{CC}	−10.0		10.0	μA
I_{IL}	Low Level Input Current	V_{IL} = GND	−10.0		10.0	μA