

# MAXIM

## 400MHz to 2500MHz, SiGe, Ultra-Low-Noise Amplifier

MAX2640/MAX2641

### General Description

The MAX2640/MAX2641 are low-cost, ultra-low-noise amplifiers designed for applications in the cellular, PCS, GPS and 2.4GHz ISM frequency bands. Operating from a single +2.7V to +5.5V supply, these devices consume only 3.5mA of current while providing a low noise figure, high input IP3, high gain, and an operating frequency range that extends from 400MHz to 2500MHz.

The MAX2640 is optimized for 400MHz to 1500MHz applications, with a typical performance of 15.1dB gain, input IP3 of -10dBm, and noise figure of 0.9dB at 900MHz. The MAX2641 is optimized for 1400MHz to 2500MHz applications, with a typical performance of 14.4dB gain, an input IP3 of -4dBm, and a noise figure of 1.3dB at 1900MHz.

These devices are internally biased, eliminating the need for external bias resistors and chokes. In a typical application, the only external components needed are a two-element input match, input and output blocking capacitors, and a Vcc bypass capacitor.

The MAX2640 and MAX2641 are designed on a high-frequency, low-noise, advanced silicon-germanium process and are offered in the space-saving 6-pin SOT23 package.

### Applications

- 400MHz/900MHz/2.4GHz ISM Radios
- Cellular/PCS Handsets
- GPS Receivers
- Cordless Phones
- Wireless LANs
- Wireless Data

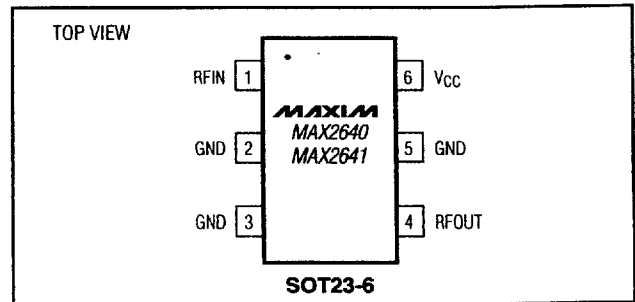
### Features

- ◆ Low Noise
  - 0.9dB Noise Figure at 900MHz (MAX2640)
  - 1.3dB Noise Figure at 1900MHz (MAX2641)
- ◆ High Gain
  - 15.1dB at 900MHz (MAX2640)
  - 14.4dB at 1900MHz (MAX2641)
- ◆ High Reverse Isolation
  - 40dB (MAX2640)
  - 30dB (MAX2641)
- ◆ Wide Operating Frequency Range
  - 400MHz to 1500MHz (MAX2640)
  - 1400MHz to 2500MHz (MAX2641)
- ◆ +2.7V to +5.5V Single Supply Operation
- ◆ Low 3.5mA Supply Current
- ◆ Ultra-Small SOT23-6 Package

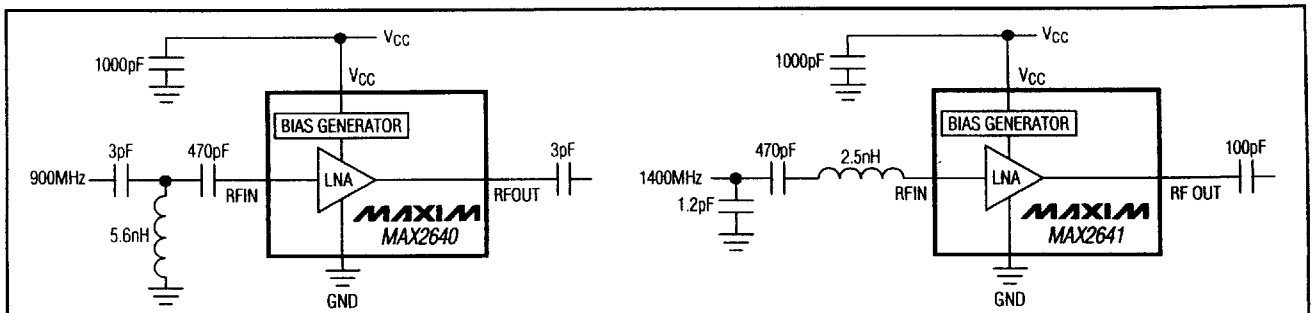
### Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE	SOT TOP MARK
MAX2640EUT-T	-40°C to +85°C	6 SOT23-6	AAAW
MAX2641EUT-T	-40°C to +85°C	6 SOT23-6	AAAW

### Pin Configuration



### Typical Operation Circuits



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Maxim Integrated Products 1

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For small orders, phone 1-800-835-8769.

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# 400MHz to 2500MHz, SiGe, Ultra-Low-Noise Amplifier

## ABSOLUTE MAXIMUM RATINGS

V <sub>CC</sub> to GND .....	-0.5V to +7V	Operating Temperature Range .....	-40°C to +85°C
RF Input and Output to GND.....	1.0Vpeak	Maximum Junction Temperature .....	+150°C
Continuous Power Dissipation (T <sub>A</sub> = +70°C)		Storage Temperature.....	-65°C to +150°C
SOT23-6 (derate 8.7mW/°C above +70°C).....	696mW	Lead Temperature (soldering, 10sec) .....	+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## DC ELECTRICAL CHARACTERISTICS

(V<sub>CC</sub> = +2.7V to +5.5V, GND = 0V, T<sub>A</sub> = T<sub>MIN</sub> to T<sub>MAX</sub>. Typical values are at V<sub>CC</sub> = 3.0V, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Supply Voltage		2.7		5.5	V
Quiescent Supply Current			3.5	4.7	mA

## RF ELECTRICAL CHARACTERISTICS

(V<sub>CC</sub> = +3.0V, GND = 0V, T<sub>A</sub> = +25°C, Z<sub>O</sub> = 50Ω, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>MAX2640 (f<sub>IN</sub> = 900MHz)</b>					
RFIN Frequency Range	(Note 1)	400		1500	MHz
Gain	(Note 2)	12.8	15.1		dB
Gain Variation Over Temperature			0.65	1.7	dB
Noise Figure	(Notes 2, 3)		0.9	1.1	dB
Input Return Loss	(Note 2)		-1		dB
Output Return Loss	(Note 2)		-14		dB
Reverse Isolation	(Note 2)		40		dB
Input 1dB Gain Compression	(Note 2)		-22		dBm
Input Third Order Intercept	(Notes 2, 4)		-10		dBm
<b>MAX2641 (f<sub>IN</sub> = 1900MHz)</b>					
RFIN Frequency Range	(Note 1)	1400		2500	MHz
Gain	(Note 3)	12.4	14.4		dB
Gain Variation Over Temperature					dB
Noise Figure	(Notes 3, 4)		1.3	1.5	dB
Input Return Loss	(Note 3)		-12		dB
Output Return Loss	(Note 3)		-12		dB
Minimum Reverse Isolation	(Note 3)		30		dB
Input 1dB Gain	(Note 3)		-21		qBm
Input Third Order Intercept	(Notes 3, 4, 5)		-4		dBm

**Note 1:** Guaranteed by design and characterization.

**Note 2:** Measured using typical operating circuit. Input and output impedance matching networks were optimized for best simultaneous gain and noise figure performance.

**Note 3:** External Circuit Losses can dramatically degrade noise figure performance. Specification excludes external component losses.

**Note 4:** Measured with 2 input tones, f<sub>1</sub> = 895MHz, f<sub>2</sub> = 905MHz, both at -34dBm per tone.

**Note 5:** Measured with 2 input tones, f<sub>1</sub> = 1895MHz, f<sub>2</sub> = 1905MHz, both at -34dBm per tone.