

## LNA Optimized for GPS (REP024)

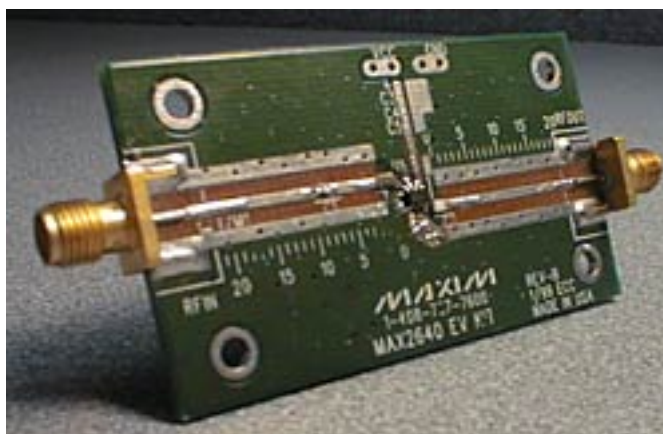
*The application note describes using the MAX2641 low-noise amplifier (LNA) in GPS. The gain at 1575MHz is 14.7dB, with a noise figure of 1.6dB. Input return loss is 9.5dB. Input third order intercept is -4.3dBm. A photo of the MAX2641 LNA evaluation kit is shown, and both lumped and transmission line implementations are provided.*

Rapid engineering prototypes are real circuits that Maxim application engineers have built and measured in our labs. They can provide a starting point for new RF designs. They are not available as evaluation kits.

Additional Information: [Wireless Product Line Page](#)

[Quick View Data Sheet for the MAX2641 LNA](#)

[Applications Technical Support](#)



*Objective: To provide an optimized solution for a GPS LNA using the MAX2641.*

By minimizing passive-component size and maximizing cost performance, the MAX2641 LNA provides an optimized solution for a global positioning system (GPS) low-noise amplifier (LNA). Two reference designs were created with the LNA: one using lumped elements and the other transmission lines for the matching circuits. The lumped-element match consists of replacing the input- and output-impedance transformation lines to the LNA with surface-mount coils, resulting

in very similar performance with smaller circuit size but extra-parts cost.

LNA gain is 14.7dB with a 1.6dB noise figure (NF) in the 1575MHz band and an IIP3 of -4.3dBm at 3mA Icc. The input match to the LNA is set for a compromise between gamma-opt and conjugate S11, for a -10dB input return loss. The output match and gain depend partly on the inclusion of a short transmission line at the Vcc pin (this is also used in the general-purpose EV board).

The MAX2641 is a low-cost LNA operating from a single +2.7V to +5.5V supply. It consumes only 3.5mA of current, while providing a low noise figure, a high gain, a high-input IP3, and an operating frequency range that extends from 1400MHz to 2500MHz. Typical performance for the MAX2641 LNA is a 14.4dB gain, an input of a -4dBm IP3, and a noise figure of 1.3dB at 1900MHz. This LNA is biased internally and designed for use in the cellular, PCS, GPS, and 2.4GHz ISM frequency band.

## MAX2641 LNA Test Conditions

- All tests in room temperature
- IIP3 measurements: Pin = -30dBm, Frf = 1575MHz and 1576MHz (GPS)
- PCS LNA input board loss = 0.2dB
- PCS LNA output board loss = 0.2dB
- Vcc: 3.0V

## MAX2641 LNA Performance Matrix

Spec Item	Measured Result
DC Supply Current (PCS mode)	3mA
LNA Gain	14.7
LNA NF	1.6
LNA IIP3	-4.3
LNA Rev. Isolation	-34.8
LNA Input Return Loss	-9.5
LNA Output Return Loss	-14.5

[MAX 2641 SiGe LNA \(1575 MHz\) Transmission Line/Lumped-Element Match](#)

[MAX2641 LNA Bill of Materials \(Transmission Line\)](#)

[MAX2641 SiGe LNA \(1575 MHz\) Lumped-Element Match](#)

[MAX2641 LNA Bill of Materials \(Lumped Element\)](#)

**More Information**

MAX2641: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)

MAX2644: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)