

Keywords: upconverter, downconverter, IF, RF, IIP3, S-parameters, S parameters, LO, LO doubler, local oscillator

Nov 01, 2000

REFERENCE DESIGN 451 INCLUDES: ✓Tested circuit ✓BOM ✓Board available ✓Test data

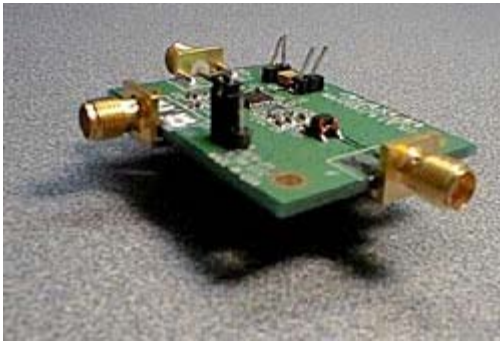
REP023: 3.5GHz Upconverter from 350MHz Achieves 9dB Gain and 1.3dBm IIP3

Abstract: This reference design (RD) shows how a downconverter with selectable LO doubler can be used as an upconverter. The RD achieves 9dB gain and 1.3dBm IIP3. The MAX2683 low-power downconverter designed to operate in the receive path of 3.5GHz wireless data transceivers is featured. Schematics, test setup, BOM, and performance results are shown.

More Information

- [Wireless Home](#)
- [Application Notes and Tutorials](#)
- [EV Kit Software](#)
- [Technical Support](#)

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.



[Click here for an overview of the wireless components used in a typical radio transceiver.](#)

Objective: To develop a circuit that applies this downconverter IC as an upconverter.

Characterized as an upconverter, the [MAX2683](#) was tested for performance converting from a 350MHz IF input band (via the RF input pin), using a 2.0GHz LO and observing the 3.55GHz output (from the differential IF out pins). A balun was used to transform the output to a 50Ω line. An upconversion gain of almost 9dB was achieved, with linearity of +1.3dBm IIP3. A set of S-parameters is available as well to support design of matching networks. The application is considered a complete success.

The MAX2683 is a high-performance low-powered downconverter intended for operating in the receive path of 3.5GHz wireless data transceivers. It offers 6dB conversion gain with variable IIP3 up to 11dBm, from between 100MHz and 400MHz IF, converting to 3.5GHz and using a low-side LO (approximately 2.7GHz LO). The MAX2683 features an LO doubler for ½ frequency local oscillator input, which can be toggled between fundamental mode and doubler mode. It operates from as low as 2.7VDC and is available in a 16-pin TSSOP package.

[Schematic for upconverter application \(PDF, 34kB\)](#)

[PCB layout plots](#)

[Bill of materials](#)

[Measurement test setup](#)

[S11 LOG MAG of RF IN input match results with V_{CC} = 3.3V](#)

[S11 LOG MAG of RF LO input match results with V_{CC} = 3.3V](#)

[S11 LOG MAG of mixer's differential output matching results with V_{CC} = 3.3V](#)

[S11 LOG MAG of RF IN input match results with V_{CC} = 5.0V](#)

[S11 LOG MAG of RF LO input match results with V_{CC} = 5.0V](#)

[S11 LOG MAG of mixer's differential output matching results with V_{CC} = 5.0V](#)

Related Parts

[MAX2683](#)

[3.5GHz Downconverter Mixers with](#)

Automatic Updates

Would you like to be automatically notified when new application notes are published in your areas of interest? [Sign up for EE-Mail™](#).

More Information

For technical support: <http://www.maxim-ic.com/support>

For samples: <http://www.maxim-ic.com/samples>

Other questions and comments: <http://www.maxim-ic.com/contact>

Application note 451: <http://www.maxim-ic.com/an451>

AN451, AN 451, APP451, Appnote451, Appnote 451

Copyright © by Maxim Integrated Products

Additional legal notices: <http://www.maxim-ic.com/legal>