24.0 GHz to 29.5 GHz, 5G, Microwave Upconverter and Downconverter

ANALOG DEVICES

Data Sheet

ADMV1018

FEATURES

RF input/output frequency range: 24.0 GHz to 29.5 GHz
2 upconversion modes
  Direct conversion from differential baseband I/Q
  Single-ended, complex IF to RF, single-sideband
    upconversion
2 downconversion modes
  Direct conversion from RF to differential baseband I/Q
    downconversion
  Single-ended complex IF image rejection conversion
LO input frequency range: 5 GHz to 15 GHz
LO doubler or quadrupler for up to 30 GHz
Matched, 50 Ω impedance, single-ended RF input and output
Matched, 50 Ω impedance single-ended LO input
Temperature compensation circuits to minimize
  temperature variations
Programmable baseband I/Q common-mode voltage
Receiver and transmitter gain and power control through
  fast settling DSA
Low phase variation vs. gain control
Fast TDD switching time via external pins
Upconversion mode
  Sideband rejection and carrier feedthrough optimization
  Envelope detector for LO feedthrough calibration
Downconversion mode
  Image rejection and I/Q imbalance optimization
  Baseband I/Q dc offset correction
Receiver mixer power detector for receiver gain setting
LO chain features
  ×2 and ×4 modes
  Variable gain to accommodate various LO drive strength
    values
>360° phase control shifter for LO synchronization, separate
  settings for receiver and transmitter modes
Programmable via a 3-wire SPI interface
60-terminal, 9 mm × 8 mm, LGA package
Common-mode input pin to track desired common mode to
  ADC, 0.75 V to 2.15 V voltage range

APPLICATIONS

5G applications
Point to point microwave radios
Radar and electronic warfare systems
Instrumentation and automatic test equipment (ATE)

GENERAL DESCRIPTION

The ADMV1018 is a silicon germanium (SiGe), microwave, upconverter and downconverter optimized for 5G radio designs operating in the 24.0 GHz to 29.5 GHz frequency range.

The upconverter offers two modes of frequency translation. The device is capable of direct conversion to RF from differential baseband inphase/quadrature (I/Q) input signals, as well as single-sideband upconversion from complex intermediate frequency (IF) inputs. The differential baseband I/Q input path can be disabled, and modulated, single-ended, complex IF signals from 2 GHz to 9.5 GHz can be fed to the IF path. These signals can then be upconverted to 24.0 GHz to 29.5 GHz while rejecting the unwanted sideband by typically greater than 25 dBc. The serial port interface (SPI) provides adjustment of the quadrature phase to allow optimum sideband rejection. In addition, the SPI interface allows powering down the output envelope detector to reduce power consumption when carrier feedthrough optimization is not necessary.

The downconverter offers two modes of frequency translation. The device is capable of direct quadrature demodulation to differential baseband I/Q output signals, as well as image rejection downconversion to a single-ended complex IF output carrier frequency. The I/Q baseband output common-mode voltage is programmable between 0.75 V and 2.15 V. The SPI provides fine adjustment of the quadrature phase to optimize I/Q demodulation performance. Alternatively, the baseband I/Q outputs can be disabled, and the I/Q signals can be passed through an on-chip, active balun to provide two, single-ended, complex IF outputs between 2 GHz and 9.5 GHz. When the device is used as an image rejecting downconverter, the unwanted image term is typically rejected to greater than 25 dBc. The ADMV1018 offers a square law power detector to allow monitoring of the power levels at the mixer inputs. The detector output provides closed-loop control of the RF digital step attenuator (DSA) via an external automatic gain control (AGC) loop.

The ADMV1018 upconverter and downconverter is housed in a compact, thermally enhanced, 9 mm × 8 mm, land grid array (LGA) package. This LGA package enables the ability to heat-sink the ADMV1018 from the top of the package for the most efficient thermal heatsinking. The ADMV1018 operates over the −40°C to +85°C case temperature range.

Throughout the figures in this data sheet, Rx means receiver and Tx means transmitter.

For more information about the ADMV1018, contact Analog Devices, Inc., at mmWave5G@analog.com.

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700   ©2019–2021 Analog Devices, Inc. All rights reserved.
Technical Support   **www.analog.com**

NOTES

www.analog.com