WiMAX/BWA/LTE RF MxFE
2 × 2 MIMO Transceiver
AD9357

FEATURES

RF transceiver with integrated 12-bit ADCs and DACs
Band: 3.3 GHz to 3.8 GHz
3.5 MHz < BW < 10 MHz
Superior receiver sensitivity with noise figure (NF) < 3 dB
Highly linear and spectrally pure transmitter
    Tx EVM: −38 dB
    SNR: >145 dB/Hz at frequency offset >70 MHz
Transmit (Tx) power control range of 58 dB,
    resolution of 0.25 dB
Receive (Rx) gain control
    Real-time monitor and control signals for manual gain
    Autonomous automatic gain control (AGC)
Automatic frequency correction: <0.012 ppm
Integrated fractional-N synthesizer
    Integrated phase noise: <0.58° rms
Multichip synchronization
Industry-standard JESD207 and ADI/Q digital interface

APPLICATIONS

WiMAX/BWA/LTE
    Femtocell/picocell/microcell base stations
    Fixed CPEs

FUNCTIONAL BLOCK DIAGRAM

Figure 1.

GENERAL DESCRIPTION

The AD9357 is a radio frequency (RF) transceiver with high performance dual receivers and transmitters, ideally suited for WiMAX, BWA, and LTE base stations and fixed CPEs. The RF MxFE® combines an RF front end with a mixed-signal baseband, enabling an easy-to-use JESD207 or ADI/Q® digital interface to the baseband processor (BBP), ASIC, or FPGA. The AD9357 operates in the 3.3 GHz to 3.8 GHz range, covering most licensed and unlicensed bands, and supports channel bandwidths of 3.5 MHz, 4.375 MHz, 5 MHz, 7 MHz, 8.75 MHz, and 10 MHz.

The direct-conversion receivers have state-of-the-art noise figure and linearity and require no external components with the exception of baluns. The complete RF subsystem integrates autonomous AGC loops, dc offset corrections, and quadrature calibrations, eliminating the need for high speed interaction with the BBP.

Two high dynamic range ADCs, followed by decimation and channel filters, digitize the received signals and produce 12-bit output signals at a sample rate determined by the bandwidth mode. The transmit path takes 12-bit input data and interpolates before converting to the analog domain and upconverting to the carrier frequency.
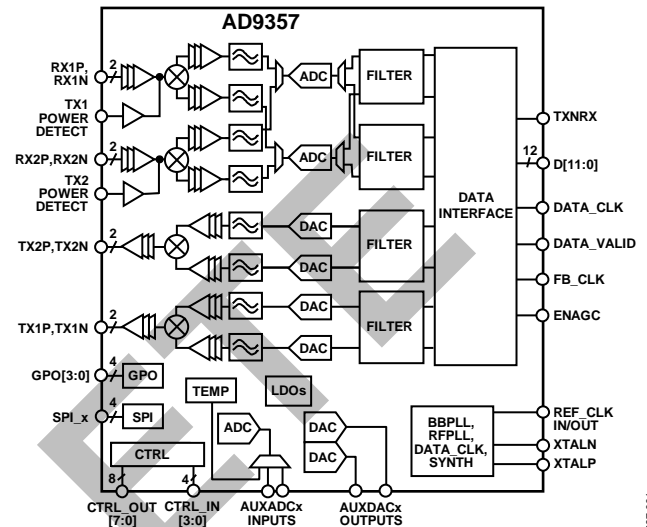
A highly linear transmit path and excellent spectral purity result in an error vector magnitude (EVM) of −38 dB, while the extremely low sideband noise of −145 dBc/Hz at 70 MHz frequency offset enables high-power picocell applications. An accurate power detector with a range of more than 50 dB in 0.25 dB steps measures the output power of each transmitter independently.

The reference frequency can be provided by an external reference clock or by an internal digitally controlled crystal oscillator (DCXO). The DCXO resolution is 0.012 ppm.

Using the built-in state machine to control the device, the AD9357 can be easily controlled in time division duplexing (TDD), half-duplex frequency division duplexing (HFDD), or, if two devices are used, frequency division duplexing (FDD) mode.

One three-input internal auxiliary ADC and two auxiliary DACs are available for system monitoring and control. A user-defined state machine can automatically sequence four GPOs. A single 3.3 V supply powers the device with on-chip low dropout linear voltage regulators (LDOs), providing all other required supplies. The AD9357 package is a 10 mm × 10 mm, 144-ball CSP_BGA.

NOTES

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DEVICES

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