ADMV1455

17.7GHz to 55GHz, Wideband, Microwave Downconverter

FEATURES

- Wideband RF input frequency range: 17.7GHz to 55GHz
- Integrated LO chain features
  - Input frequency range: 8.85GHz to 27.5GHz
  - Internal 2× multiplier
  - Programmable LO harmonic reject filter
  - I/Q phase correction
- Integrated mixer features
  - Two frequency translation modes:
    - Differential I/Q mode
    - Single output IF mode
  - Programmable I/Q baseband common-mode voltages and dc offset correction
  - Image reject and I/Q imbalance optimization
  - Allows for high performance DC to 8GHz (50Ω differential output impedance) and a low performance DC to 4GHz (100Ω differential output impedance) baseband modes
- Power detector for receiver automatic gain control
- Fully programmable overload protection circuit for detecting high power conditions and automatically powering down the down-converter to prevent damage
- NVM for calibration of part-to-part gain and filter corner frequency variations
- Impedance matched input and output pins
- Programmable via 3-wire or 4-wire SPI
- General purpose logic outputs for integration with other chips
- Look-up table logic inputs for fast frequency hopping applications
- 120-ball, 6mm × 6.5mm, BGA package (see the Outline Dimensions section)

APPLICATIONS

- Radar and electronic warfare systems
- SATCOM ground station and payload applications
- Instrumentation and automatic test equipment (ATE)
- Millimeter-wave 5G tester applications

GENERAL DESCRIPTION

The ADMV1455 is a highly integrated microwave downconverter optimized for wideband radio designs operating in the 17.7GHz to 55GHz RF range. It can be used as a smaller alternative to larger multichip implementations, allowing for reduced size, weight, and power at the system level.

The ADMV1455 has an integrated local oscillator (LO) signal chain, that accepts LO input signals in the 8.85GHz to 27.5GHz range. Within the LO signal chain are internal amplifiers, a frequency 2× multiplier, a programmable harmonic reject filter, and phase adjust circuitry, which produces the necessary 17.7GHz to 55GHz signal to drive the internal mixer.

The ADMV1455 has two, switch selectable, RF input signal chains. One chain operates within the 17.7GHz to 34GHz range, and the other operates in the 30GHz to 55GHz range. Each chain has multiple stages of low noise amplifiers (LNAs), signal level control, and harmonic filtering. A square law power detector is provided to allow monitoring of the power levels at the mixer inputs.

The ADMV1455 offers single output IF and differential in-phase/quadrature (I/Q) modes of frequency translation. The single output IF mode provides one intermediate frequency (IF) output signal, in the 2GHz to 12GHz range, utilizing the on-chip 90° IF hybrid. The differential I/Q mode provides differential baseband I/Q output signals, from DC to 8GHz.

Immediately following the mixer is the IF/BB chains. The IF chain uses an on-chip integrated 90 degree hybrid followed by multiple gain stages, digital step attenuators (DSAs), and an integrated programmable band-pass filter for signal level control and filtering. The ADMV1455 includes integrated gain look-up and frequency look-up tables addressed through the serial port interface (SPI) or directly using external address bits to allow fast switching for frequency hopping applications.

The RF input, LO input, and IF output pins are all single-ended and matched to 50Ω impedance. The differential I/Q baseband output pins are matched to a 50Ω differential impedance and have programmable I/Q baseband common-mode voltages.

A programmable SPI is provided, which can be operated in either 3-wire or 4-wire implementations. The SPI allows LO feedthrough adjustment, image reject optimization, filtering, and gain control and configuring general-purpose logic outputs for integration with other chips.

The ADMV1455 downconverter comes in a BGA package which enables the ability to heat sink the ADMV1455 from the top of the package for the most efficient thermal heat sinking. The ADMV1455 operates over the −40°C to +85°C case temperature range.

Rev. PrE

FUNCTIONAL BLOCK DIAGRAM

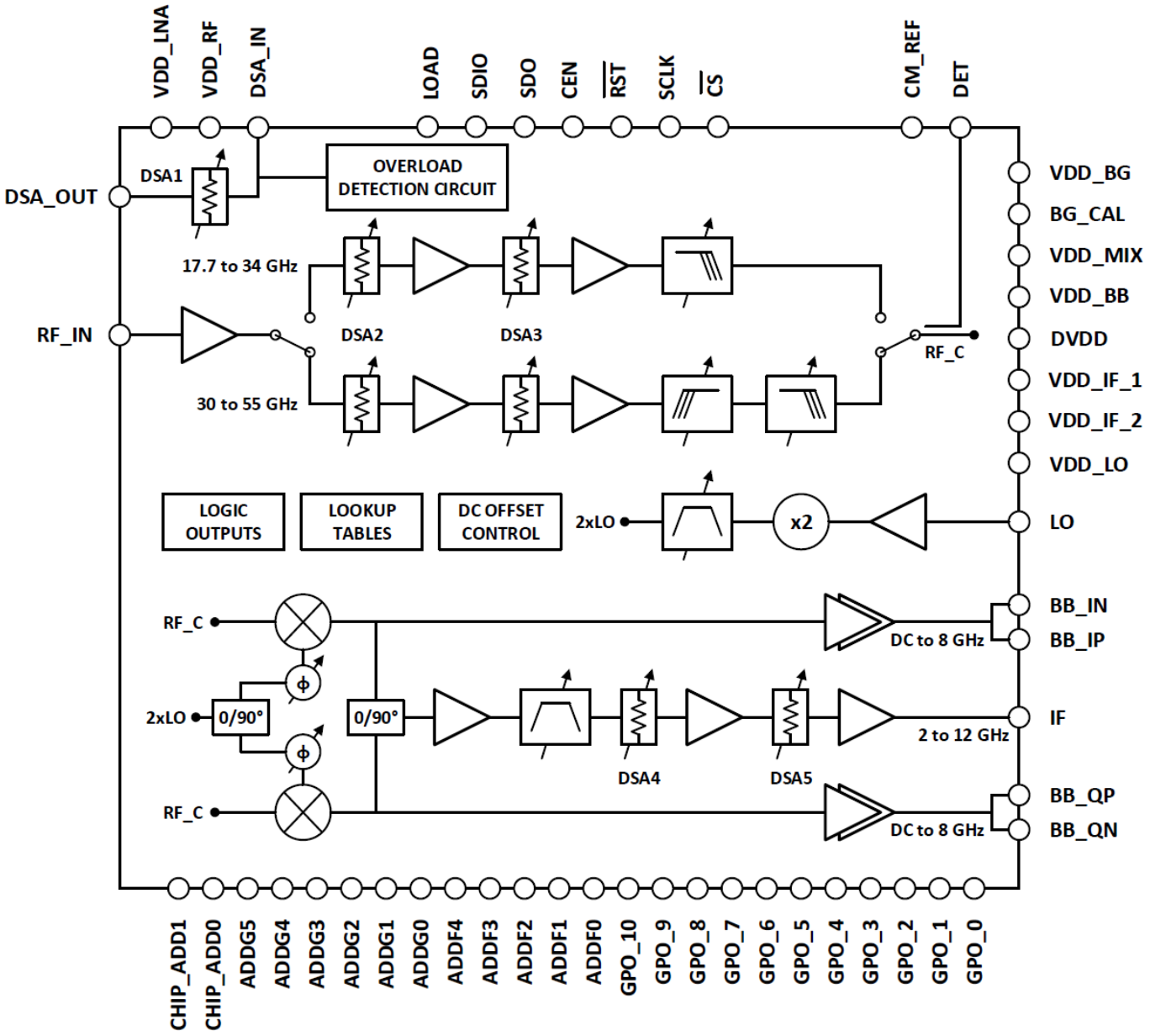

Figure 1. Functional Block Diagram

OUTLINE DIMENSIONS

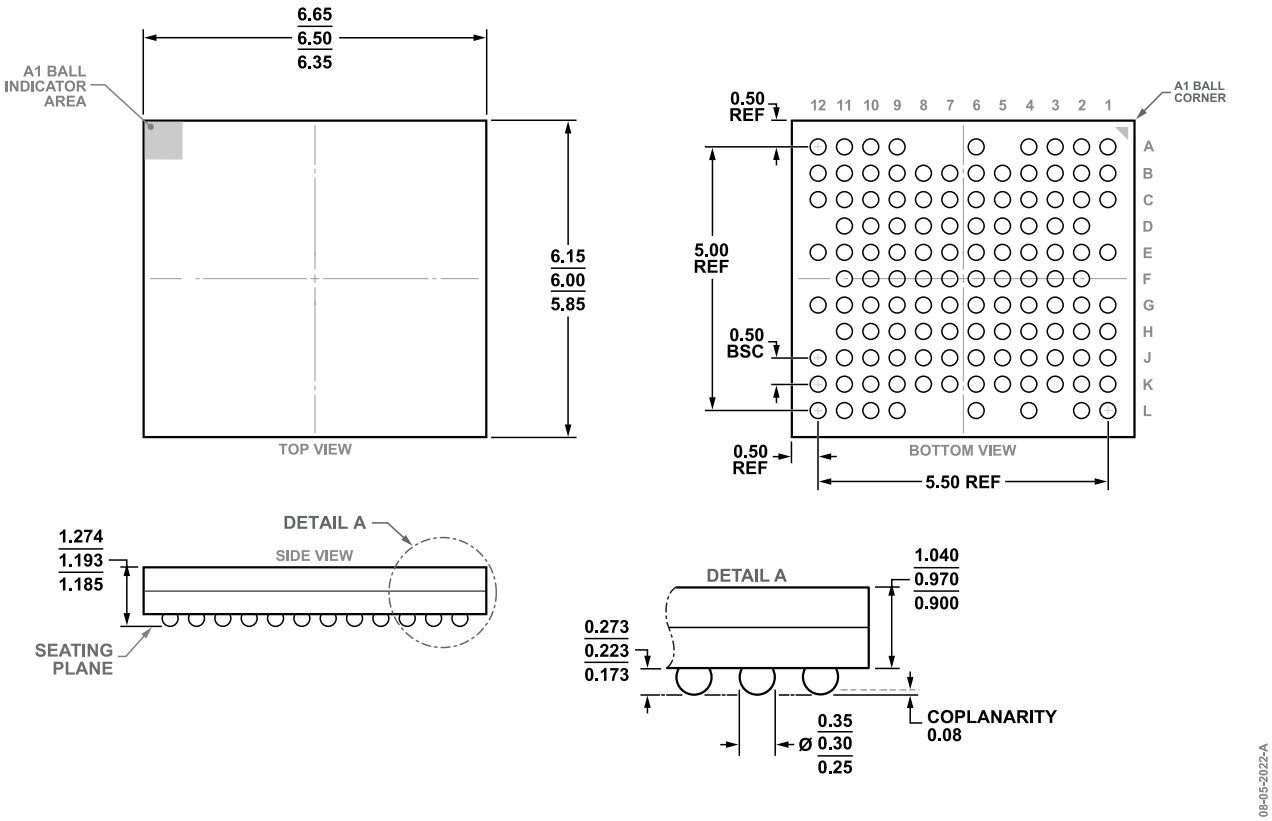

Figure 2. 120-Ball Chip Scale Package Ball Grid Array [CSP_BGA],
(BC-120-4)
Dimensions Shown in Millimeters