Octal LNA/VGA/AAF/ADC and Crosspoint Switch

AD9273

FEATURES

- 8 channels of LNA, VGA, AAF, and ADC
- Low noise preamplifier (LNA)
  - Input-referred noise voltage = 1.2 nV/√Hz (gain = 21.3 dB) @ 5 MHz typical
  - SPI-programmable gain = 15.6 dB/17.9 dB/21.3 dB
  - Single-ended input; V_{IN} maximum = 733 mV p-p/550 mV p-p/367 mV p-p
  - Dual-mode active input impedance matching
  - Bandwidth (BW) > 100 MHz
  - Full-scale (FS) output = 4.4 V p-p differential
- Variable gain amplifier (VGA)
  - Attenuator range = −42 dB to 0 dB
  - SPI-programmable PGA gain = 21 dB/24 dB/27 dB/30 dB
  - Linear-in-dB gain control
- Antialiasing filter (AAF)
  - Programmable 2nd-order low-pass filter (LPF) from 8 MHz to 18 MHz
  - Programmable high-pass filter (HPF)
- Analog-to-digital converter (ADC)
  - 12 bits at 10 MSPS to 50 MSPS
  - SNR = 70 dB
  - SFDR = 75 dB
  - Serial LVDS (ANSI-644, IEEE 1596.3 reduced range link)
  - Data and frame clock outputs
- Includes an 8 × 8 differential crosspoint switch to support continuous wave (CW) Doppler
- Low power, 109 mW per channel at 12 bits/40 MSPS (TGC)
- 70 mW per channel in CW Doppler
- Flexible power-down modes
- Overload recovery in <10 ns
- Fast recovery from low power standby mode, <2 µs
- 100-lead TQFP

APPLICATIONS

- Medical imaging/ultrasound
- Automotive radar

GENERAL DESCRIPTION

The AD9273 is designed for low cost, low power, small size, and ease of use. It contains eight channels of a low noise preamplifier (LNA) with a variable gain amplifier (VGA); an antialiasing filter (AAF); and a 12-bit, 10 MSPS to 50 MSPS analog-to-digital converter (ADC).

Each channel features a variable gain range of 42 dB, a fully differential signal path, an active input preamplifier termination, a maximum gain of up to 52 dB, and an ADC with a conversion rate of up to 50 MSPS. The channel is optimized for dynamic performance and low power in applications where a small package size is critical.

FUNCTIONAL BLOCK DIAGRAM

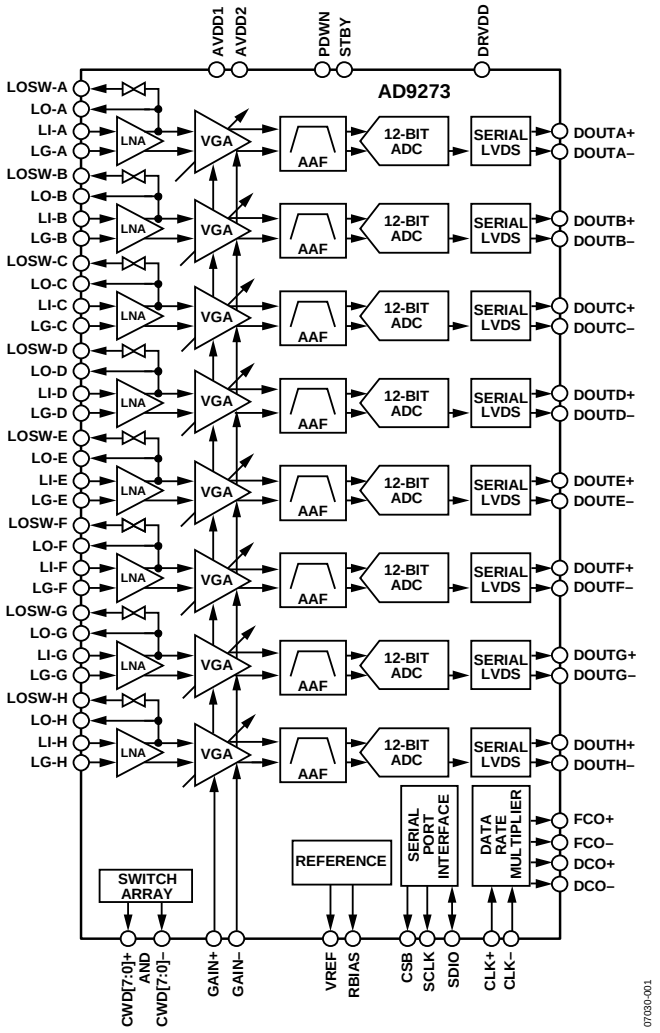

Figure 1.

The LNA has a single-ended-to-differential gain that is selectable through the SPI. The LNA input-referred noise voltage is typically 1.2 nV/√Hz at a gain of 21.3 dB, and the combined input-referred noise voltage of the entire channel is 1.4 nV/√Hz at maximum gain. Assuming a 15 MHz noise bandwidth (NBW) and a 21.3 dB LNA gain, the input SNR is about 91 dB. In CW Doppler mode, the LNA output drives a transconductance amp that is switched through an 8 × 8 differential crosspoint switch. The switch is programmable through the SPI.

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