

ADE7953

Single-Phase Multifunction Energy Metering IC with Neutral Current Measurement



Features

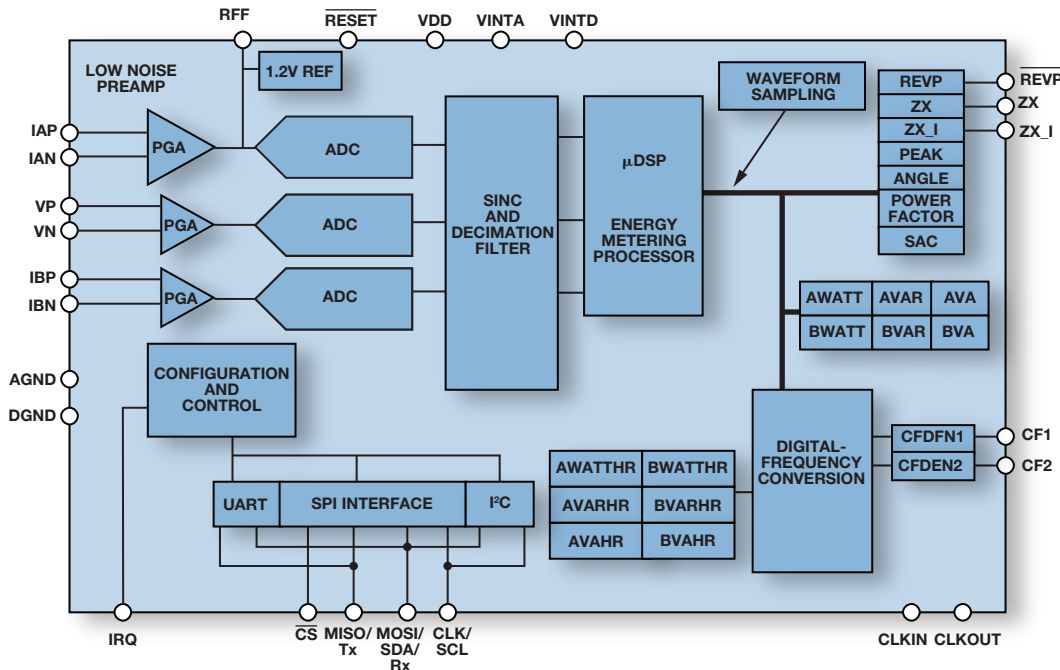
- Measures active, reactive, apparent energy, sampled waveform, current and voltage rms
- Provides a second current input for neutral current measurement
- Less than 0.1% error in active and reactive energy measurement over a dynamic range of 3000:1
- Less than 0.2% error in instantaneous I rms and V rms measurements over a dynamic range of 500:1
- Provides apparent energy measurement and instantaneous power readings
- 1.5 kHz bandwidth operation
- Flexible PGA gain stage (up to 22×)
- Includes internal integrator for use with Rogowski coil
- UART, I²C, or SPI communication

Overview

The ADE7953 is a high accuracy electrical energy measurement IC intended for single-phase applications. It measures line voltage and current and calculates active, reactive, apparent energy and instantaneous rms voltage and current.

The ADE7953 meets the needs of the most demanding energy metering applications and provides a wide choice of power measurement information, including power quality data and tamper detect conditions. The device is suitable for multifunction smart electricity meters, power distribution units for corporate data centers, and in-home energy monitors for consumers.

Functional Block Diagram



General Description

The device incorporates three high performance Σ - Δ ADCs with a high accuracy energy measurement core. The third input channel simultaneously measures neutral current and enables tamper detection and neutral current billing. The additional channel incorporates a complete signal path that allows a full range of measurements. Each input channel supports independent and flexible gain stages, making the device suitable for use with a variety of current sensors, such as current transformers (CTs) and low value shunt resistors. Two on-chip integrators facilitate the use of Rogowski coil sensors.

The ADE7953 provides access to on-chip registers via a variety of communication interfaces, including SPI, I²C, or UART. Two configurable pulse output pins provide outputs that are proportional to active, reactive, or apparent energy, as well as current and voltage rms. A full range of power quality information, such as overcurrent, overvoltage, peak, and SAG detection are accessible via the external IRQ pin. Independent active, reactive, and apparent no-load detections are included to prevent meter “creep.” Dedicated reverse power (REVP), zero-crossing voltage (ZX), and zero crossing current (ZX-I) pins are also provided. The ADE7953 energy metering IC operates from a 3.3 V supply voltage and is available in a 28-lead LFCSP package.

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I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP semiconductors).

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