Atmel M90E32AS

Enhanced Poly-Phase High-Performance Wide-Span Energy Metering IC

DATASHEET

FEATURES

Metering Features

- Metering features fully in compliance with the requirements of IEC62052-11, IEC62053-22 and IEC62053-23, ANSI C12.1 and ANSI C12.20; applicable in poly-phase class 0.2S, 0.5S or class 1 watt-hour meter or class 2 var-hour meter.
- Accuracy of ±0.1% for active energy and ±0.2% for reactive energy over a dynamic range of 6000:1.
- Temperature coefficient is 6 ppm/ ℃ (typ.) for on-chip reference voltage. Automatically temperature compensated.
- Single-point calibration on each phase over the whole dynamic range for active energy; no calibration needed for reactive/ apparent energy.
- ±1 ℃ (typ.) temperature sensor accuracy.
- Flexible piece-wise non-linearity compensation: three current (RMS value)-based segments with two programmable thresholds for each phase. Independent gain and phase angle compensation for each segment.
- Electrical parameters measurement: less than ±0.5% fiducial error for Vrms, Irms, mean active/ reactive/ apparent power, frequency, power factor and phase angle.
- Active (forward/reverse), reactive (forward/reverse), apparent energy with independent energy registers.
- Programmable startup and no-load power thresholds.
- 6 dedicated ADCs for phase A/B/C current and voltage sampling circuits. Current sampled over Current Transformer (CT) or Rogowski coil (di/dt coil); voltage sampled over resistor divider network.
- Programmable power modes: Normal, Idle, Detection and Partial Measurement mode.
- Fundamental (0.2%) and harmonic (1%) active energy with dedicated energy / power registers and independent energy outputs.
- Current and voltage instantaneous signal monitoring.
- Enhanced event detection: sag, over voltage, phase loss, over current, reverse V/I phase sequence, calculated neutral line current I_{NC} over-current and frequency upper and lower threshold.

Other Features

- 3.3V single power supply. Operating voltage range: 2.8V~3.6V. Metering accuracy guaranteed within 3.0V~3.6V.
- Four-wire SPI interface.
- Programmable voltage sag detection and zero-crossing output.
- Crystal oscillator frequency: 16.384MHz. On-chip two capacitors and no need of external capacitors.
- Lower power consumption. I=13mA (typ.) in Normal mode.
- TQFP48 package.
- Operating temperature: -40 ℃ ~ +85 ℃ .

APPLICATION

- Poly-phase energy meters of class 0.2S, 0.5S and class 1 which are used in three-phase four-wire (3P4W, Y0) or three-phase three-wire (3P3W, Y or Δ) systems.
- Power monitoring instruments which need to measure voltage, current, mean power, etc.

GENERAL DESCRIPTION

The M90E32AS is a poly-phase high performance wide-dynamic range metering IC. The M90E32AS incorporates 6 independent 2nd order sigma-delta ADCs, which could be employed in three voltage channels (phase A, B and C) and three current channels (phase A, B, C) in a typical three-phase four-wire system.
The M90E32AS has an embedded DSP which executes calculation of active energy, reactive energy, apparent energy, fundamental and harmonic active energy over ADC signal and on-chip reference voltage. The DSP also calculates measurement parameters such as voltage and current RMS value as well as mean active/reactive/apparent power.
A four-wire SPI interface is provided between the M90E32AS and the external microcontroller.
The M90E32AS is suitable for poly-phase multi-function meters which could measure active/reactive/apparent energy and fundamental/harmonic energy either through four independent energy pulse outputs CF1/CF2/CF3/CF4 or through the corresponding registers.
The ADC and auto-temperature compensation technology for reference voltage ensure the M90E32AS's long-term stability over variations in grid and ambient environment conditions.

BLOCK DIAGRAM

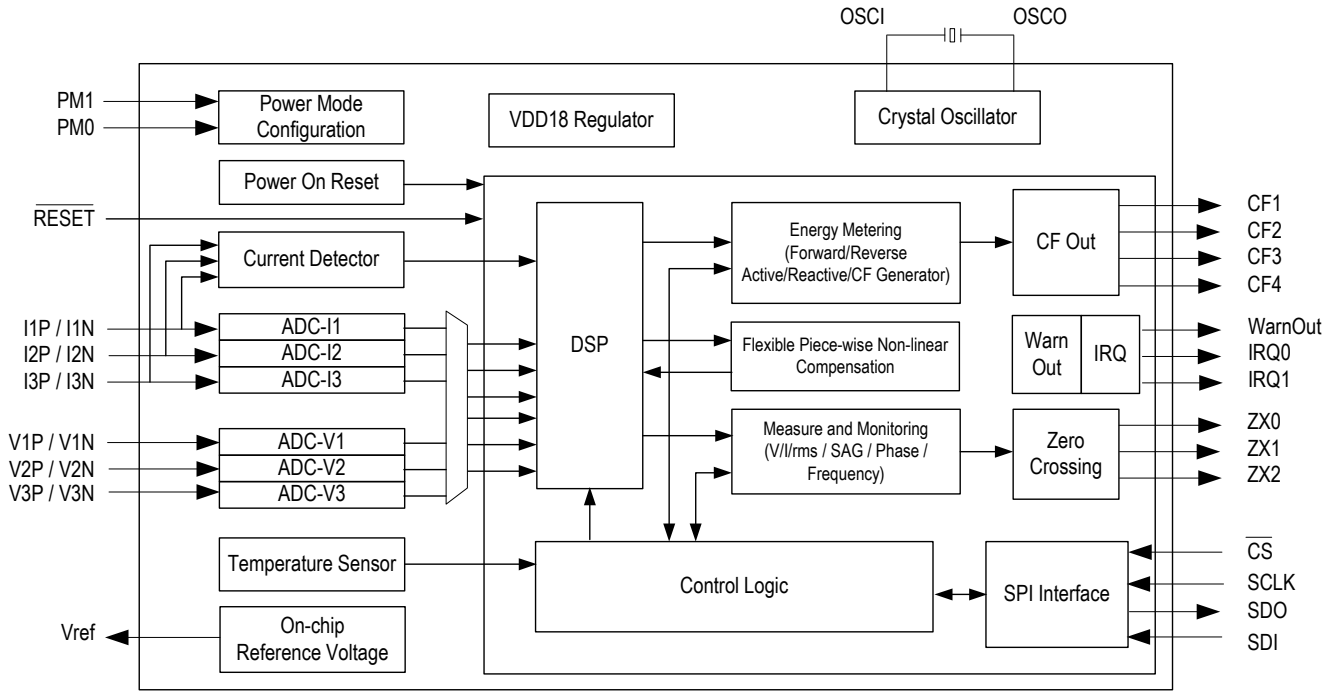

Figure-1 M90E32AS Block Diagram