austriamicrosystems

AS8218 / AS8228
Highly Integrated Single Phase 2-Current Energy
Metering Integrated Circuits with Microcontroller, RTC,
Programmable Multi-Purpose I/Os and LCD Driver

FEATURES

1. Key Features

- Precision single-phase, one or two current input energy measurement front-end including Sigma-Delta modulators for A/D-conversion and digital signal processor (DSP).
- Low current consumption of 5mA, depending on MCU activity.
- Digital phase correction and selectable gain on both current channels for use with two current transformers (CT) or one CT and one shunt.
- Power-supply monitor (PSM) for power-on reset and reset when the supply voltage falls below a defined threshold.
- Customer programmable 8-bit 8051 compatible microcontroller (MCU).
- Programmable MCU clock with optional low power operating conditions.
- 2 x Universal Asynchronous Receiver / Transmitters (UART) for external communications such as programme download and debugging.
- Real-time clock/calendar (RTC) with on-chip digital calibration and separate battery backup pin.
- On-chip voltage reference (VREF) with small temperature coefficient.
- Low power 3.0 – 4.0MHz crystal oscillator.
- SPI compatible interface for external EEPROM memory.
- Standard on-chip LCD driver (LCDD) interface.
- Programmable multi-purpose I/Os (MPIO) with selectable data direction, pull-up or pull-down resistors and drive strength.
- Low power battery operating mode for meter reading when Mains voltage is not present.
- The difference between the AS8218 and AS8228 ICs are:
  AS8218: 20 x 4 segment LCDD
  9 x multi-purpose I/O (MPIO)
  AS8228: 24 x 4 segment LCDD
  12 x multi-purpose I/O (MPIO)

2. General Description

The AS8218 / AS8228 are highly integrated CMOS single-phase energy metering devices for fully electronic LCD meter systems. The AS8218 / AS8228 have been designed to ensure that meters can fully comply with the international Standards IEC1036 and ANSI.

The AS8218 / AS8228 ICs include all the functions required for conventional 1 current or 2-current anti-tamper meters. The functions include precision energy measurement, an 8-bit microcontroller unit (MCU), an on-chip Liquid Crystal Display driver (LCDD), programmable and selectable multi-purpose Inputs/Outputs (MPIO), a real time clock/calendar (RTC) for complex tariff functions such as time-of-use or maximum demand billing and a Serial Peripheral Interface (SPI) for reading data from and writing data to an external non-volatile memory (EEPROM).

The AS8218 / AS8228 ICs have a dedicated energy measurement front-end, which include an analog front-end and programmable Digital Signal Processor (DSP) from which active energy, mains voltage and mains current are provided. Reactive and apparent energy can also be calculated.

The on-chip 8-bit 8051 compatible microcontroller is freely programmable and provides user access to the various functional blocks. The dedicated Universal Asynchronous Receiver / Transmitter (UART1) in the System Control block provides access to various system functions and blocks. A second UART (UART2) is also provided, which may for example be used for debugging. The on-chip memory includes 24kByte program memory and 1kByte data memory.

Due to the large diversity of non-volatile memory requirements for fully electronic single-phase metering systems, the AS8218 / AS8228 ICs allow the system designer to select the size of the external EEPROM memory, 1kByte to 32kByte (in binary steps).

The system timing and real time clock (RTC) has a dedicated supply pin (VDD_BAT), which is separate from the rest of the IC, enabling the oscillator to be supplied with an external battery during 'power-

down'. The RTC may be digitally calibrated for oscillator frequency accuracy. The LCD Driver (LCDD) block enables the display of information provided by the microcontroller, directly to the LCD. Two dedicated data register banks are provided to simplify programming, particularly in the case where the display data needs to be scrolled.

The programmable multi-purpose I/O pins (MPIO) may be independently configured as dedicated inputs or outputs. All the I/O pins are programmable for data direction, pull-up/pull-down resistors and drive strength (4mA/8mA). Such functions may include LED energy consumption pulse output, energy direction and fault condition

indication depending on current 1 or current 2 being active for the energy calculation, push button for display scrolling, mains isolation relay control for prepayment meters, optical interface etc.

An on-chip analog ground buffer (ABUF) and voltage reference (VREF) ensures that no external circuitry is required. A power-supply monitor (PSM) provides a reset, when VDD falls below a safe operating threshold.

The AS8218 / AS8228 ICs are available in a LQFP64 plastic package.
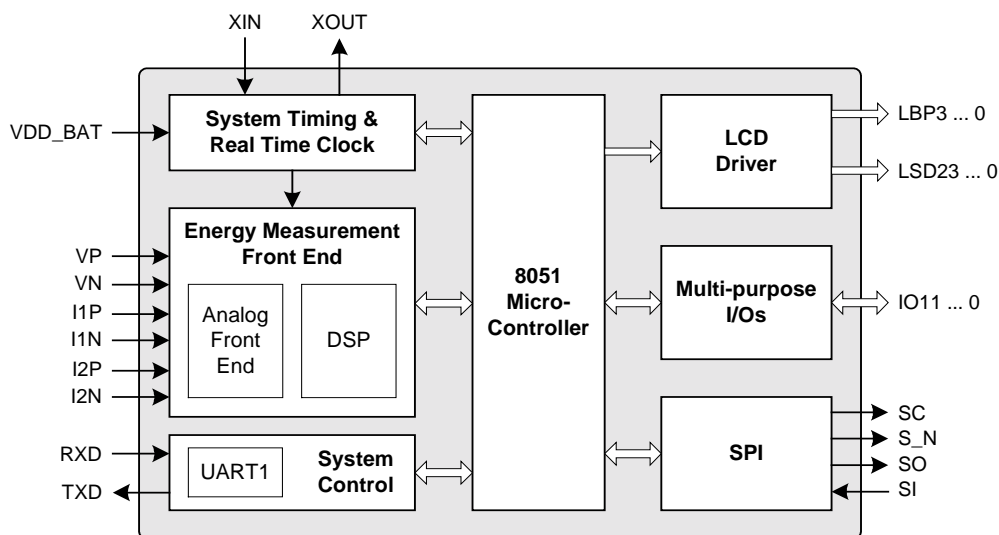
3. AS8218 / AS8228 Block Diagram

Figure 1:   AS8218 / AS8228 block diagram

4. Contact

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