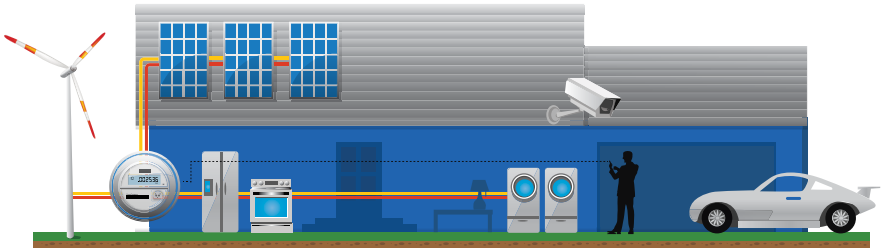
Atmel Power Line Communications

Solutions for the Smart Grid

Key Applications

- Home and industrial automation
- Control systems
- Smart metering
- Intelligent lighting
- Smart appliances
- Other machine-to-machine (M2M) applications

Powering the Smart Grid



With the growing popularity of micro-generation sources like solar and wind power, smart energy is now a two-way street, as energy moves to and from the consumer. Power line communications (PLC), which taps into the world's existing wired power line infrastructure, is quickly becoming the optimal technology to deliver the data rates and robustness required by the smart grid— safely, quickly and dependably.

Atmel's family of PLC system-on-a-chip (SoC) solutions is designed specifically for narrowband communications using the low-voltage electric grid. Drawing on our deep expertise in PLC technology, we've created solutions providing:

- High performance and integration levels
- Low power
- Lower bill-of-materials (BOM) costs
- PRIME compliance
- CENELEC compliance

PRIME ALLIANCE™

Our solutions are full digital implementations with best-in-class sensitivity, high temperature stability and highly efficient line drivers. With free software stacks for PLC, you'll be able to easily manage your PLC networks and focus on your top-level applications.

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OFDM Solutions

Our OFDM SoCs combine hardware accelerators with an optimized PLC coupling. These SoCs achieve baud rates up to 128kbps and feature boot loaders, serial peripheral interface (SPI) and UART interfaces.

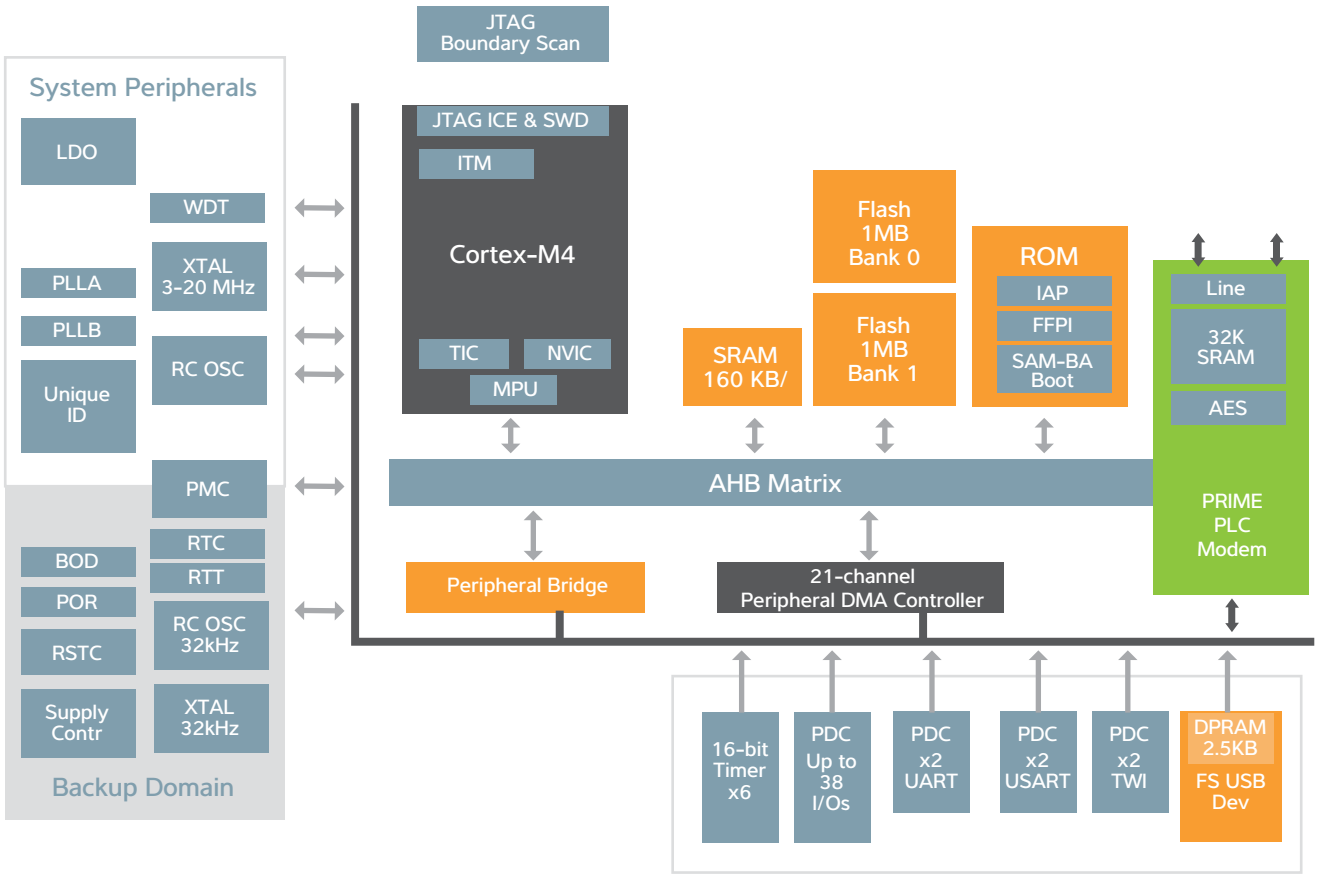
SAM4SP32A

With an unprecedented level of integration, low power and performance, the Atmel SAM4SP32A system-on-a-chip (SoC) solution is the world's first single-chip device based on an ARM® Cortex®-M4 processor-based microcontroller (MCU) and targeted to the emerging PLC smart metering market. The SAM4SP32A SoC, which incorporates a pure digital implementation, complies with the latest Power Line Intelligent Metering Evolution (PRIME) PLC specification.

Key Benefits

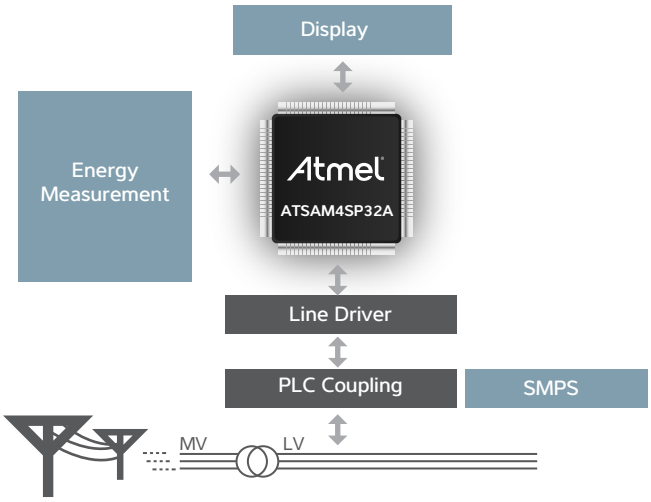
- Lower system costs and faster time to market due to high level of integration
- Exceptional dynamic range and sensitivity to meet smart meter requirements
- Compact, efficient and low-power solution
- PRIME compliance
- Pure digital implementation

SAM4SP32A System-on-Chip Block Diagram



For an efficient design process, the SAM4SP32A device is supported by the **Atmel Studio 6** integrated development platform (IDP). Available free of charge, the Atmel Studio 6 IDP includes more than 1,600 project examples with source code and debuggin, simulation and editing tools.

SAM4SP32A PRIME Meter Solution

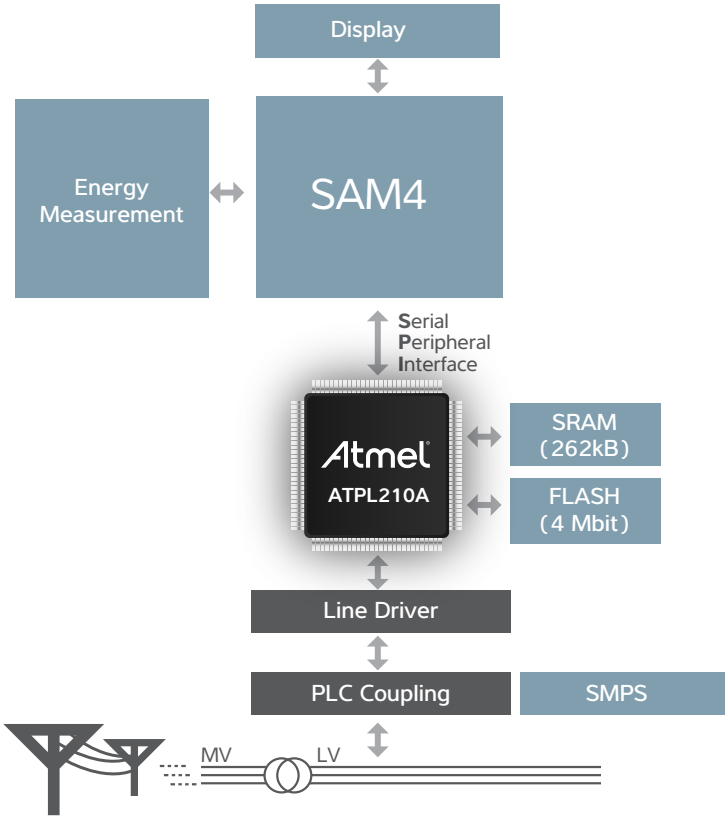


ATPL210A

The Atmel **ATPL210A** SoC implements a full PLC modem. In addition to an enhanced 8051 MCU, the ATPL210A SoC includes a media access controller (MAC) and a modem circuit for power line medium using OFDM.

- Saves board space, cost and development time, since you can use the integrated 8051 MCU as your PRIME MCU
- Saves CPU time because the hardwired MAC reduces the CPU load in PLC systems running the PRIME protocol stack
- Saves more than 1W of power consumption per system

ATPL210A PRIME Meter Solution



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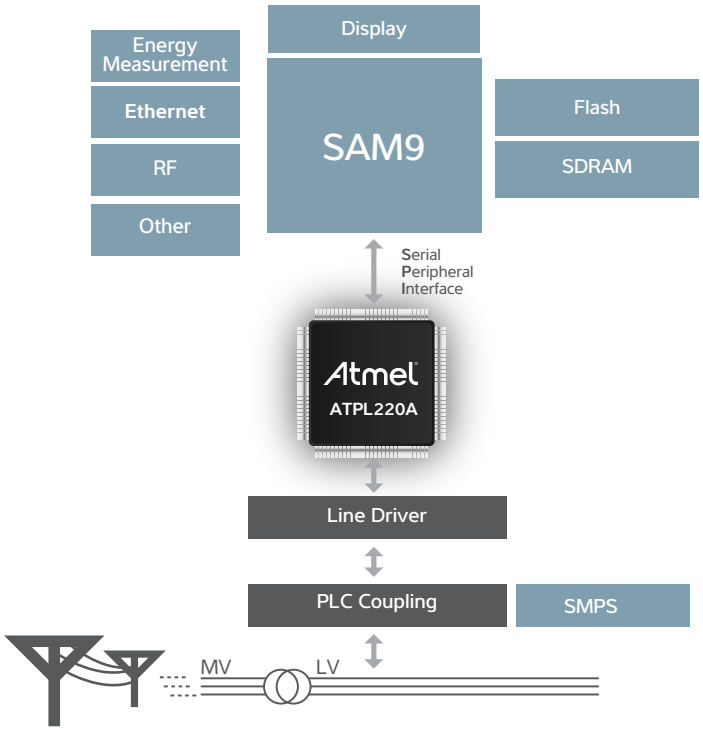
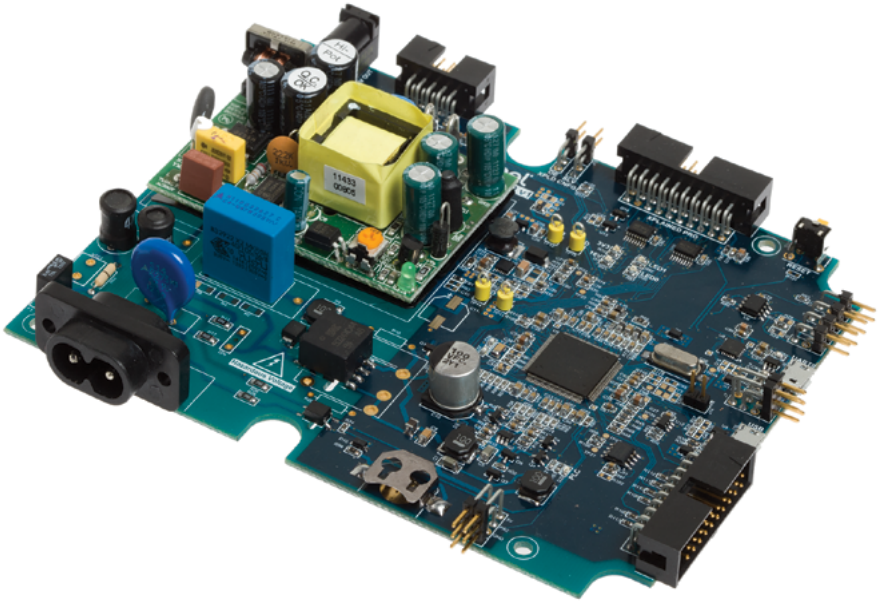
ATPL220A

The Atmel **ATPL220A** device is designed for PLC base nodes implementation, with support for mono-phase and multi-phase PLC injection. Achieve mono-phase injection via a single device. For multi-phase PLC injection, use several ATPL220A devices and our multiple input, multiple output (MIMO) technology.

- Unique active multiphase PLC PRIME technology
- Provides excellent performance against noise and at high temperatures
- Consumes minimal power
- Offers outstanding coupling with low BOM costs
- Improve network coverage and system performances

ATPL220A PRIME Single-Phase DC Solution

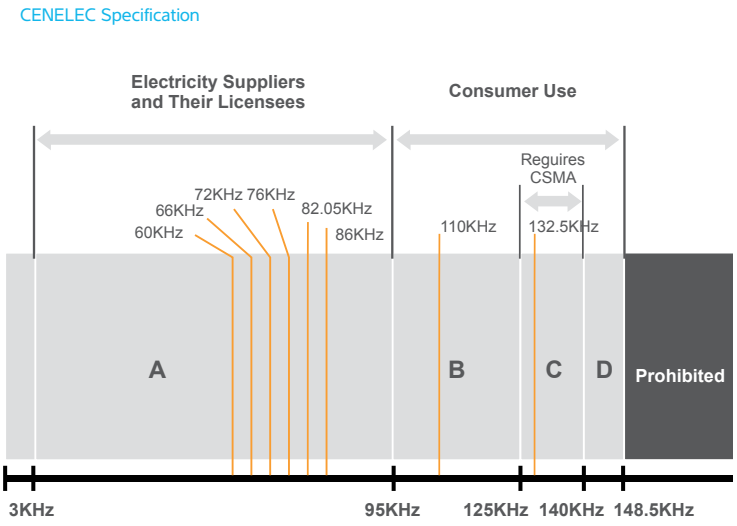




SAM4SP32A
Evaluation Kit

Single-Carrier Narrowband Solutions

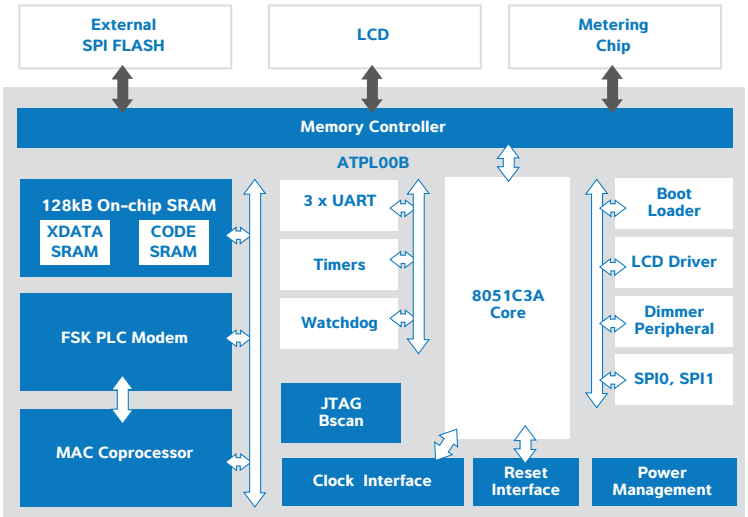
Our single-carrier narrowband SoCs integrate specifically designed hardware units (enhanced 8051 MCU, dimmer peripheral and PLC modem), our fully digital technology and an optimized line driver. As a result, you get low-cost, high-performance SoCs with an optional Embedded Communications Software Stack (ECSS) that provides a complete system-level solution.



ATPL100A

The Atmel **ATPL100A** SoC implements a full PLC node using frequency-shift keying (FSK) modulations. The ATPL100A device includes an enhanced 8051 MCU, a MAC and a modem circuit for power line medium.

- Saves board space, cost and development time, since you can use the integrated 8051 MCU as your primary MCU
- Saves CPU time because the hardwired MAC reduces the CPU load in PLC systems
- Saves more than 1W of power consumption per system
- Delivers excellent communication performance, with baud rates up to 4,800bps



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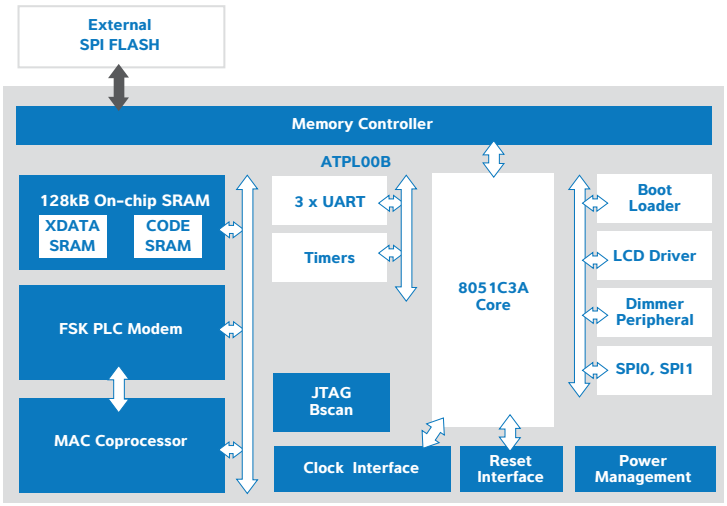
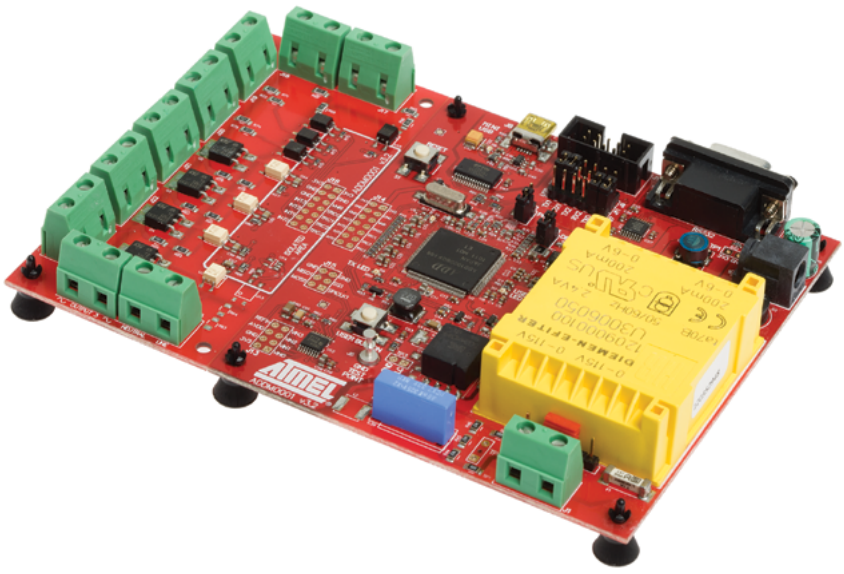
ATPL00B

The Atmel **ATPL00B** PLC SoC includes an enhanced 8051 MCU, a MAC and a FSK modem circuit for the CENELEC C band power line medium specifications. Ideal for industrial and home automation applications, the ATPL00B SoC uses a single 3.3V DC power supply.



- Delivers fast CPU speeds, with machine cycles reduced from 12 to 3 clock cycles and all instructions executed in 1 or 2 machine cycles. Programs are executed 5X faster than they are in standard 8051 MCUs.
- Saves CPU time as various control software tasks are implemented in hardware to reduce computational load of the integrated 8051 MCU
- Includes dimmer peripheral that controls up to four triacs and four switches, and supports phase angle control for power regulation



ATPL00B
Evaluation Board

Our PLC SoCs are backed by design resources that will help you move quickly from concept to finished product. We offer a complete line of hardware and software libraries, along with development kits, reference designs, application notes, development tools and monitoring software.

Interested in learning more about Atmel's PLC solutions?
Visit www.atmel.com/products/other/power_line_communications

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