Marvell PXA300 Processor Series

Scalable Performance up to 624 MHz for Cost-Effective and Power-Efficient
Smartphones, Embedded Solutions, and Handheld Devices

PRODUCT OVERVIEW

The Marvell® PXA300 processor, with scalable performance to 624 MHz and video performance capabilities, enables the development of cost-efficient smartphones, industrial embedded solutions, and handheld devices such as GPS. Built on a low-power 90 nanometer (nm) process technology, and with the ability to dynamically scale voltage and frequency on demand, the PXA300 supports today's stringent requirements for longer battery life.

KEY FEATURES AND PLATFORM BENEFITS

The PXA300 processor and its derivatives, with options for stacked NAND flash and mobile DDR memory, integrate the following features:

- Consumers can enjoy the features of 3.5G HSDPA networks for extended periods, such as browsing rich Web2.0 content with streaming video.

- Marvell® Scalable Power Manager technology for MIPS/mW power efficiency, delivering long battery life and enabling consumers to spend more time enjoying the rich features their devices and service providers offer.

- Intel® Wireless MMX™ 2 technology, a 2D graphics accelerator, and a 256 KB frame buffer designed to support video codecs enhance the user's experience of popular usage models like video playback, video conferencing, video telephony, and digital TV.

- An enhanced set of peripherals eases connectivity to technologies like Wi-Fi, WiBro, WiMAX, and Bluetooth v2.0, and the Quick Capture interface supports camera sensors up to 2–3 megapixels (MP) for richer camera applications.

- Package options of a discrete 13x13 mm and a 19x19 mm package, and 15x15mm parts with stacked NAND flash and mobile DDR memory in die-stacked and package-on-package (PoP) configurations enable sleek form-factors.

OEM AND CARRIER BENEFITS

Manufacturers benefit from devices featuring the PXA300 processor by being able to showcase cost-efficient smartphones and PDAs, personal multimedia players, embedded industrial handhelds, and other portable devices with cutting-edge features. A comprehensive support package enables OEMs to take advantage of available leading operating system images, optimized multimedia codecs and middleware, tools, and applications supported by a rich hardware and software ecosystem, accelerating time to market (TTM) and return on investment (ROI).

Network operators benefit from the new capabilities in the PXA300 processor. With up to 624 MHz of processing power, the user will be able to enjoy the benefits of complex and concurrent usage models that increase average revenue per user (ARPU). For example:

- Consumers can enjoy the features of 3.5G HSDPA networks for extended periods, such as browsing rich Web2.0 content with streaming video. The PXA300 processor, with efficient video playback and Marvell's Scalable Power Manager, gives users long battery life, enabling them to take advantage of network features for longer periods of time.

- The available performance in the PXA300 allows a customer to simultaneously listen to an MP3 file, play a video game, and have a voice conversation.

CODE COMPATIBILITY AND ECOSYSTEM SUPPORT

The PXA3xx processor family is the third generation of applications processors based on the Intel XScale® technology. To preserve existing investments in applications software, the PXA300 processor maintains backward compatibility with previous PXA processors, as well as processors within the PXA3xx processor family. To further reduce time-to-market (TTM), Marvell provides tuned and validated Windows Mobile, Windows CE, and Linux board-support packages, codecs and multimedia frameworks, and OpenGL-ES 1.1 libraries, as well as optimized compilers, debuggers, and profilers.

The vast ecosystem of software and hardware vendors continues with the Marvell PXA3xx processor family to provide rich and differentiated platforms. Over 150 applications and codecs are optimized for the processors and more than 30 leading hardware vendors provide support with development environments and devices. Combine these offerings with the high-quality documentation and support, and OEMs/ODMs have a path to cost-effective handsets and handheld devices to increase ROI.

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▶ KEY APPLICATIONS

Targeted devices include:

- Low-cost smartphones with video and audio playback and image capture.
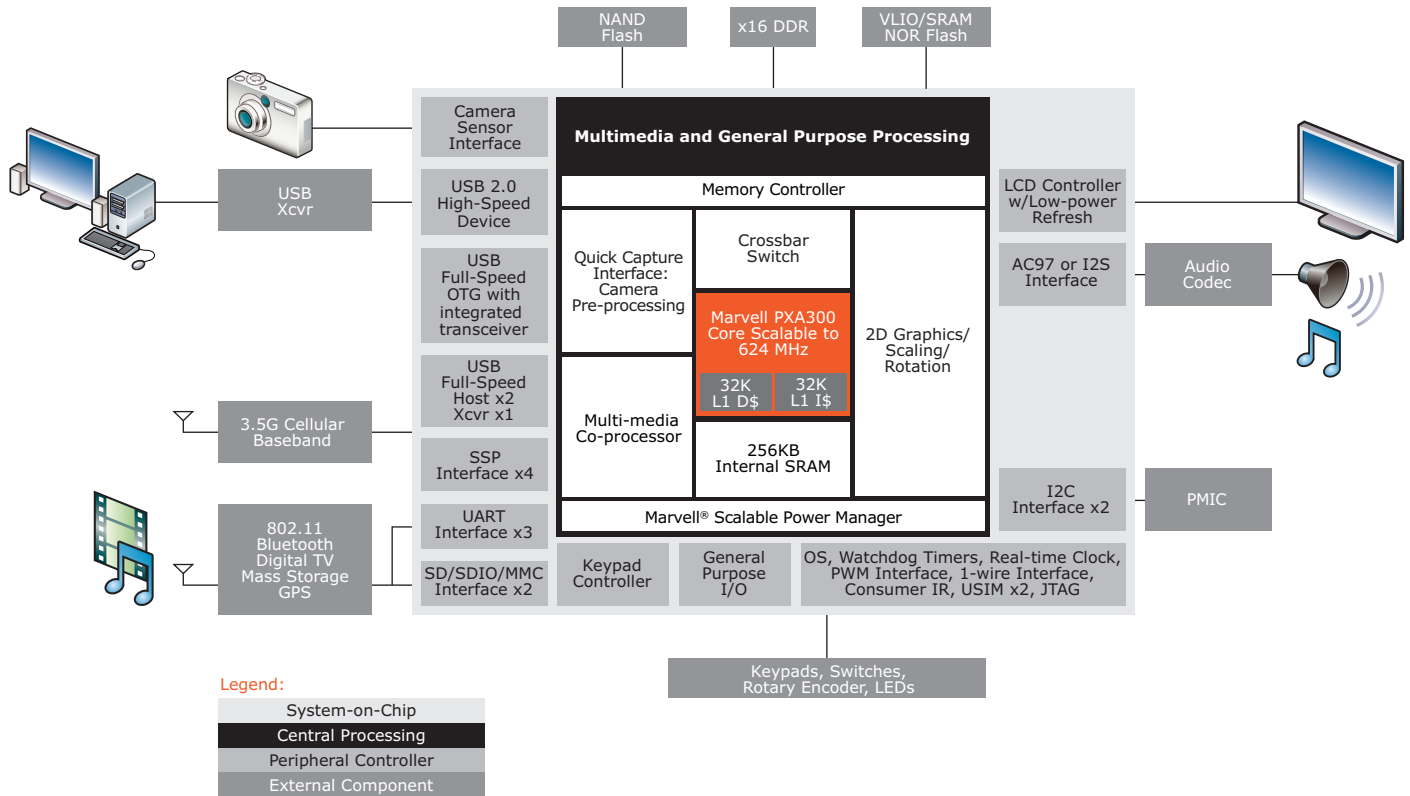- GPS and industrial embedded solutions.

▶ PXA300 PROCESSOR KEY FEATURES

FEATURES	BENEFITS
• Scalable core up to 624 MHz, 16-bit DDR interface	• Up to 624 MHz core clock provides burst-processing when needed, such as for processing of video streams and Web browsing.
• Marvell® Scalable Power Manager	• Extends battery life in usage scenarios such as phone standby, video and music playback, and general-purpose applications processing. Includes hardware and software processing to dynamically change the voltage and frequency of the processor depending on the workload.
• 90 nm low-power process	• Low-power customized process allows for lower voltages and enables low-cost solutions for the mobile market.
• 256 KB frame buffer	• Supports an internal QVGA frame buffer for applications such as streaming H.264 compressed video, video playback from network services, video conferencing, and in-home entertainment systems.
• Multimedia acceleration with Intel® Wireless MMX™ 2 technology	• Support for audio, video, and other multimedia processing via SIMD co-processor. The PXA300 supports up to D1, 30fps decode and up to CIF, 30fps encode, depending on the codec format.
• Code compatibility	• Improves TTM by allowing manufacturers to reuse applications written for PXA or ARM-compliant processors, and lowers development costs by reducing the number of resources required for a derivative product. Allows high degree of hardware and software reuse, migrating from the PXA270 processor and other processors in the PXA3xx processor family.
• Versatile interfaces	• Integrated interfaces, including a NAND memory controller, USB2.0 high-speed device, and Enhanced Quick Capture technology, enable the implementation of complex usage scenarios at a competitive cost. Enables easy connectivity to 3.5G wireless baseband modules, DVB-H, Wi-Fi, WiMAX, Bluetooth v2.0, and other peripherals. Supports a wide variety of camera sensors up to 2–3 MP resolution.
• Multiple package options, including stacked memory and a 19x19mm package for embedded designs.	• Stacked NAND and DDR memory reduces board real-estate sizes for sleek, thin form-factor designs.

▶ POWER-EFFICIENT SCALABLE PERFORMANCE TO 624 MHz

The PXA300 processor provides millions of instructions per second (MIPS) on demand to 624 MHz, speeding Web-page browsing, video encode and decode applications, file compression, and PIM/office applications, among others. The microarchitecture, combined with support for 130 MHz 16-bit SDRAM DDR memory provides headroom to support multimedia evolution, application multitasking, and complex use cases. But advanced performance does not come at the cost of battery life. Fine-grained power modes integrated into the processor design, Marvell Scalable Power Manager Technology (MSPM) for dynamic voltage and frequency scaling, and an advanced 90 nm process enable power-efficient performance, resulting in long battery life.

▶ FOUNDATION FOR A COST-EFFECTIVE, HIGH-PERFORMANCE PLATFORM

The PXA300 processor integrates technologies into compact, powerful devices for network operators, enterprises, and consumers. A new low-latency, fully connected internal memory switch eliminates memory bottlenecks, while separate interfaces for 16-bit DDR memory and Flash memory (NANDX8, NANDX16, and NOR) provide performance for cost-sensitive phone features and platform flexibility. More and faster peripheral interfaces, including high-speed serial interfaces, enable Wi-Fi, WiBro, and WiMAX connectivity, and address the needs of multiple market segments.

NAND Flash

x16 DDR

VLIO/SRAM NOR Flash

Camera Sensor Interface

USB 2.0 High-Speed Device

USB Full-Speed OTG with integrated transceiver

USB Full-Speed Host x2 Xcvr x1

SSP Interface x4

UART Interface x3

SD/SDIO/MMC Interface x2

USB Xcvr

3.5G Cellular Baseband

802.11 Bluetooth Digital TV Mass Storage GPS

Multimedia and General Purpose Processing

Memory Controller

Quick Capture Interface: Camera Pre-processing

Crossbar Switch

Marvell PXA300 Core Scalable to 624 MHz

32K L1 D$ | 32K L1 I$

Multi-media Co-processor

256KB Internal SRAM

2D Graphics/ Scaling/ Rotation

Marvell® Scalable Power Manager

Keypad Controller

General Purpose I/O

OS, Watchdog Timers, Real-time Clock, PWM Interface, 1-wire Interface, Consumer IR, USIM x2, JTAG

LCD Controller w/Low-power Refresh

AC97 or I2S Interface

I2C Interface x2

Audio Codec

PMIC

Keypads, Switches, Rotary Encoder, LEDs

Legend:
- System-on-Chip
- Central Processing
- Peripheral Controller
- External Component

PXA300 Processor Block Diagram

ENHANCED VIDEO AND AUDIO PERFORMANCE

The PXA300 processor enables next-generation cell phones and smartphones, GPS devices, and industrial handhelds, with support for multiple codec formats streaming video playback at 30 fps, 2 MP camera capture, and DVB-H. With a new memory architecture and support for faster DDR memory, the PXA300 processor delivers fast video performance at a low cost. And multimedia processing can take advantage of the SIMD instruction set which includes new instructions for speech and video algorithms.

ABOUT THE PXA3xx PROCESSOR FAMILY

The PXA3xx applications processor family enables new services and capabilities across multiple device segments of the communications and computing world. PXA3xx processors make possible a new category of converged devices that are small, sleek, highly energy efficient, and that feature standards-based communications capabilities.

PXA3xx processor family performance enables a wide variety of features and usage models. From a low-cost, 200 MHz smartphone to higher end, multimedia-rich feature phones, the versatile PXA3xx processor-based platform complements a broad range of the most popular consumer electronics devices and embedded applications.

The latest advancements in trusted computing set the PXA3xx processors apart from previous-generation technologies. The platform combines both hardware and software elements, provides robust security for consumers, and allows designers to migrate applications to this new-generation processor family with ease. With a wide range of performance, power, and integration levels, the PXA3xx processors meet the needs of current and future wireless devices.

▶ **THE MARVELL ADVANTAGE**

Marvell products come with complete reference designs which include board layout designs, software, manufacturing diagnostic tools, documentation, and other items to assist customers with product evaluation and production. Marvell's worldwide field application engineers collaborate closely with end customers to develop and deliver new leading-edge products for quick time-to-market. Marvell utilizes leading semiconductor foundry and packaging services to reliably deliver high-volume and low-cost total solutions.

▶ **ABOUT MARVELL**

Marvell is a leader in storage, communications, and consumer silicon solutions. Marvell's diverse product portfolio includes switching, transceiver, communications controller, processors, wireless, power management and storage solutions that power the entire communications infrastructure, including enterprise, metro, home, storage and digital entertainment. Today's cell phone and handheld users demand the latest and greatest in mobile functionality. From full-color displays and voice recognition to video streaming and Bluetooth capabilities, Marvell communications and applications processors deliver full-featured, media-rich experiences to the palm of your hand. Marvell's communications and applications processors feature advanced integration, multimedia acceleration, and superior power savings that propel the evolution of mobile devices. For more information, visit our website at www.marvell.com.