

# Marvell PXA320 Processor Series

Cost-Effective, Scalable Performance up to 806 MHz for Power-Efficient, High-End Multimedia Handsets, Embedded Solutions, and Enterprise-Class Devices



## ▶ PRODUCT OVERVIEW

Leading the Marvell® PXA3xx processor family, the PXA320 processor, with scalable performance to 806 MHz, plus additional industry-leading processing features, enables outstanding compute and video performance for high-end, multimedia cell phones and PDAs, industrial embedded solutions, and enterprise-class devices. Built on a low-power 90 nanometer (nm) process technology, and with the ability to dynamically scale voltage and frequency on demand, the PXA320 supports today's stringent requirements for longer battery life.

## ▶ KEY FEATURES AND PLATFORM BENEFITS

The PXA320 processor integrates the following features:

- Scalable, general-purpose processing up to 806 MHz, a 256 KB L2 cache, and a 32-bit DDR memory interface for richer end-user applications, such as browsing rich Web2.0 content or streaming video. Extended headroom allows for execution of multiple applications at the same time, which is a key requirement for today's wireless client devices with advanced capabilities.
- 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 768 KB frame buffer designed to support VGA resolution streaming video enhance the user's experience of popular usage models like video playback, video conferencing, camcorder functionality, video telephony, and digital TV.
- An enhanced set of peripherals eases connectivity to technologies like Wi-Fi, WiBro, WiMAX, and Bluetooth v1.2, and the Quick Capture interface supports camera sensors up to 2–3 megapixels (MP) for richer camera applications.
- Package options of a discrete 14x14 mm package and a 15x15 mm package-on-package (PoP) package with stacked NAND flash and mobile DDR memory enable sleek form-factors.

## ▶ OEM AND CARRIER BENEFITS

Manufacturers benefit from devices featuring the PXA320 processor by being able to showcase higher-end phones and PDAs, personal multimedia players, embedded industrial handhelds, Mobile Internet Devices (MIDs) and other portable devices with cutting-edge features at an efficient cost. 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 PXA320 processor. With up to 806 MHz of processing power, along with a large level 2 cache and frame buffer, the user will be able to enjoy the benefits of complex and concurrent usage models that increase average revenue per user (ARPU). For example:

- With long battery life and powerful video processing, consumers can enjoy advanced features of 3G and HSDPA networks—such as streaming H.264 VGA video—for extended periods.
- The available performance in the PXA320 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 PXA320 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:

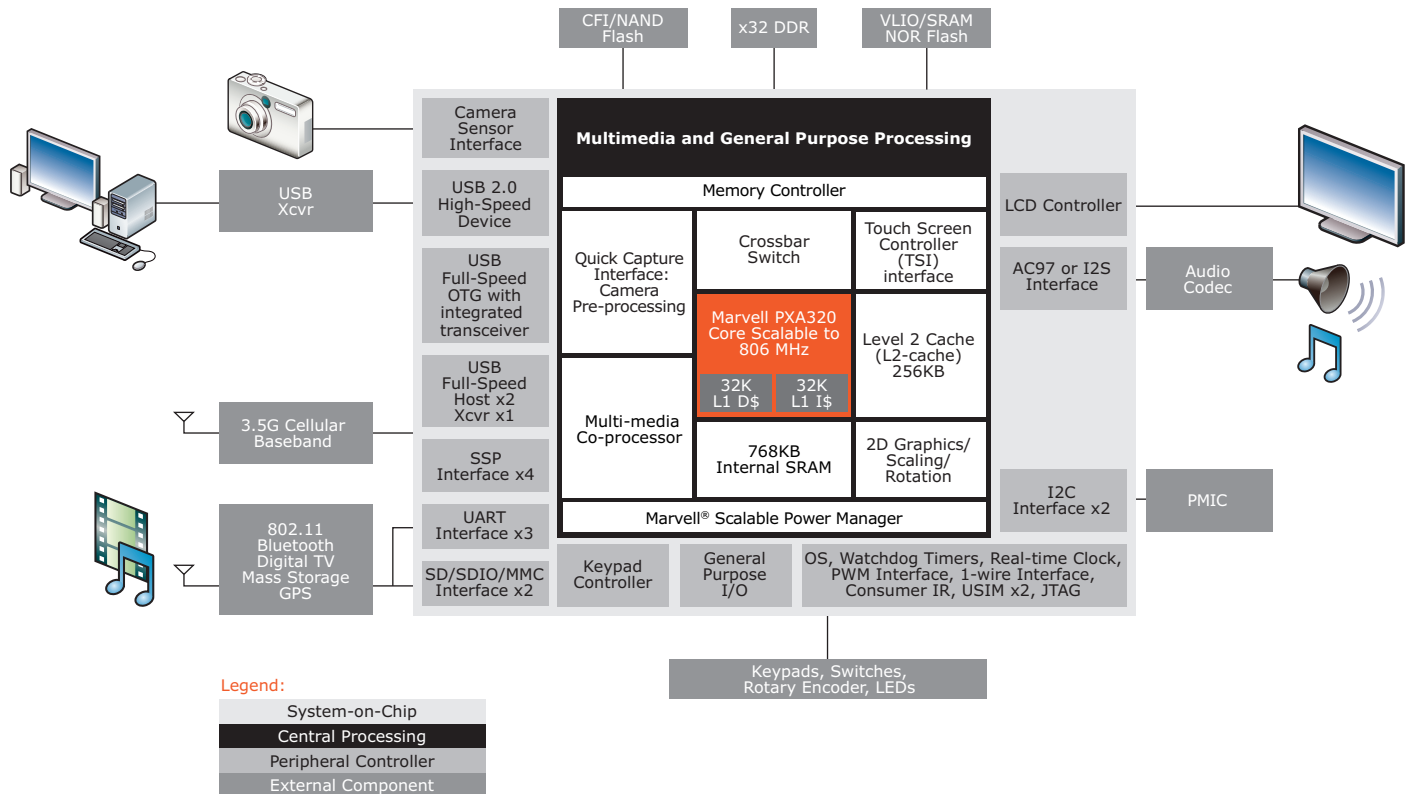
- High-end smartphones, PDAs, Mobile Internet Devices (MIDs), and personal media players with demanding imaging, video, multimedia, and video conferencing capabilities.
- Wireless enterprise devices with built-in Wi-Fi, WiBro, and WiMAX.
- Embedded solutions featuring video telephony, video/voice over IP (VVoIP), and GPS.

## ▶ PXA320 PROCESSOR KEY FEATURES

FEATURES	BENEFITS
<ul style="list-style-type: none"><li>• Scalable core up to 806 MHz, 256 KB L2 cache, 32-bit DDR interface</li></ul>	<ul style="list-style-type: none"><li>• Up to 806 MHz core clock provides burst-processing when needed. Powerful core features enable faster data movement across the platform and offer more headroom for multitasking applications, processing enhancements, and complex use cases.</li><li>• Helps complete tasks sooner for better end-user experience and lower power in computing tasks, such as Web browsing, file compression, and other applications.</li></ul>
<ul style="list-style-type: none"><li>• Marvell® Scalable Power Manager</li></ul>	<ul style="list-style-type: none"><li>• Helps extend 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.</li></ul>
<ul style="list-style-type: none"><li>• 90 nm low-power process</li></ul>	<ul style="list-style-type: none"><li>• Low-power customized process allows for lower voltages and enables low-cost solutions for the mobile market.</li></ul>
<ul style="list-style-type: none"><li>• 768 KB frame buffer</li></ul>	<ul style="list-style-type: none"><li>• Supports VGA-quality graphics for applications such as streaming H.264 compressed video, video playback from network services, video conferencing, and in-home entertainment systems.</li></ul>
<ul style="list-style-type: none"><li>• Multimedia acceleration with Intel® Wireless MMX™ 2 technology</li></ul>	<ul style="list-style-type: none"><li>• Support for audio, video and other multimedia processing via SIMD co-processor. The PXA320 supports up to D1, 30fps decode and up to CIF, 30fps encode, depending on the codec format.</li></ul>
<ul style="list-style-type: none"><li>• Code compatibility</li></ul>	<ul style="list-style-type: none"><li>• Improves TTM by allowing manufacturers to reuse applications written for PXA technology 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.</li></ul>
<ul style="list-style-type: none"><li>• Versatile interfaces</li></ul>	<ul style="list-style-type: none"><li>• Integrated interfaces, including 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 3G wireless baseband modules, DVB-H, Wi-Fi, WiMAX, Bluetooth v1.2, and other peripherals. Supports a wide variety of camera sensors up to 2–3 MP resolution.</li></ul>

## ▶ POWER-EFFICIENT SCALABLE PERFORMANCE TO 806 MHz

The PXA320 processor provides million of instructions per second (MIPS) on demand to 806 MHz, speeding Web-page browsing video encode and decode applications, file compression, and PIM/office applications among others. The micro-architecture, combined with an L2 cache and support for 130 MHz 32-bit DDR SDRAM 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, an Instruction Power Manager (IPM) for dynamic voltage and frequency scaling, and an advanced 90 nm process enable power-efficient performance, resulting in long battery life.



PXA320 Processor Block Diagram

## ▶ FOUNDATION FOR A VERSATILE PLATFORM

The PXA320 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 32-bit DDR memory and Flash memory (NANDX8, NANDX16, and NOR) provide performance for premium phone features and platform flexibility. More and faster peripheral interfaces, including high-speed serial interfaces, enable Wi-Fi, WiBro, and WiMAX connectivity. A built-in touch-screen and LCD controller supports high-end PDA phones and other touch-screen driven devices. Plus support for removable memory cards makes the PXA320 processor ideal for a range of designs needing performance and flexibility to address the needs of multiple market segments.

## ▶ ENHANCED VIDEO AND AUDIO PERFORMANCE

The PXA320 processor enables next-generation, high-end, multimedia phones and PDAs, enterprise-class handhelds, and personal media players, with D1-quality, streaming video playback at 30 fps, digital camcorder features up to CIF, 30fps, 5 MP camera capture, video telephony, and DVB-H. With a large frame buffer, new memory architecture, and support for faster DDR memory, the PXA320 processor boosts video performance up to 40 percent over previous-generation PXA270 processors.<sup>1</sup> The PXA320 processor spends less time in active mode while decoding H.264 video streams, and delivers higher video performance while lowering power consumption. 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.

<sup>1</sup>Benchmark data collected for a QCIF stream ("foreman") using an H.264 decoder at 624 MHz.

## ▶ 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](http://www.marvell.com).



**Marvell Semiconductor, Inc.**

5488 Marvell Lane  
Santa Clara, CA 95054

Phone 408.222.2500  
[www.marvell.com](http://www.marvell.com)

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