Marvell PXA310 Processor Series

Rich Multimedia with Scalable Performance up to 624 MHz for
Cost-Effective and Power-Efficient Secure 3.5G Smartphones,
Portable Navigation/Entertainment Devices, and Embedded Solutions

MARVELL®

▶ PRODUCT OVERVIEW

The PXA310 processor joins the PXA3xx family as a cost-effective mobile solution with up to 624 MHz of power-efficient compute performance, hardware video acceleration, and DRM security. Video performance at up to D1 resolution enables entertainment-on-the-go with a wide variety of content from consumer devices and the Internet. Built on a low-power 90 nanometer (nm) process technology, the combination of low-power modes and the ability to adjust voltage and frequency dynamically on demand supports exceptional battery life in standby modes and in multimedia usage models. Discrete and PoP package options enable sleek form-factors.

▶ KEY FEATURES AND PLATFORM BENEFITS

The PXA310 processor series includes the following key features:

- Processing up to 624 MHz for faster end-user experiences, such as rendering rich Web2.0 content, and scalable headroom for multitasking with advanced 3.5G usage models

- Marvell® Scalable Power Manager technology for MIPS/mW power efficiency, delivering long battery life

- Integrated hardware video acceleration and hardware security/DRM processing for up to D1 video playback and camcorder functionality, video telephony, and digital TV

- Enhanced peripheral speeds and features, including support for camera sensors up to 5 megapixels (MP), help reduce BOM cost

- Package options of a discrete 13x13 mm and a 15x15 mm package-on-package (PoP) package with stacked NAND flash and mobile DDR memory enable sleek form-factors

▶ KEY APPLICATIONS

Targeted devices include:

- Secure 3.5G multimedia phones with music, video, and digital TV

- Embedded solutions including video telephony, video/voice over IP (V/VoIP), and GPS

- Ultra-mobile devices with WVGA displays and wireless enterprise devices

▶ OEM AND CARRIER BENEFITS

Manufacturers benefit by delivering phones, GPS, and other portable devices with high-performance, cutting-edge features at an efficient cost. Marvell's platform deliverables, such as high-quality drivers, optimized codecs and middleware, tools, and applications supported by a rich hardware and software ecosystem, enable OEMs to reduce development time and boost their return on investment (ROI).

Network operators benefit from the new capabilities of the PXA310 processor, including enhanced security and web rendering with long battery life, by expanding services and increasing average revenue per user (ARPU). For example:

- Consumers can enjoy the features of 3.5G HSDPA networks—such as browsing rich Web2.0 content with streaming video—for extended periods. The PXA310 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.

- Hardware security helps operators safely distribute paid, protected content over their networks, and protect devices and networks from viruses and other risks from stolen handsets. Operators can manage their handsets without interfering with other protected applications.

▶ POWER-EFFICIENT, HIGH-PERFORMANCE PROCESSING UP TO 624 MHz

The PXA310 processor builds on the PXA300 processor's performance and energy efficiency by adding hardware engines for video and JPEG acceleration and security/DRM. These features provide more headroom for core tasks or a reduced duty-cycle for improved battery life. The PXA310 processor can burst on demand to 624 MHz, speeding web-page rendering, file compression, and office applications, and it provides the headroom to support application multitasking. The processor's power-efficient design means tasks running at 624 MHz can be as power efficient as those running at lower speeds, thus improving battery life.

Marvell PXA310 Processor Series

▶ **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 PXA310 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.

▶ **HARDWARE VIDEO AND IMAGE ACCELERATION FOR 3.5G MULTIMEDIA USE**

The PXA310 processor includes hardware video and JPEG acceleration with scaling and rotation, enabling next-generation video playback, digital TV, and camcorder capability with increased battery life.

- The video acceleration extends the multimedia performance offered by the SIMD instruction set of Intel® Wireless MMX™ 2 technology, which includes new instructions for speech and video algorithms.

- Support for H.264, MPEG-4, MPEG-2, WMV9, and RealVideo formats with up to D1 resolution at 30 frames per second (fps), allows for viewing and sharing of rich, popular content from the Internet and from other entertainment devices.

The enhanced Quick Capture Interface provides support for raw sensors up to 5 MP and sensors with integrated JPEG and YUV422 output, and image pre-processing functions. Hardware processing for conversion to YUV420 and for JPEG compression/decompression keeps the core free for additional processing and helps lower power.
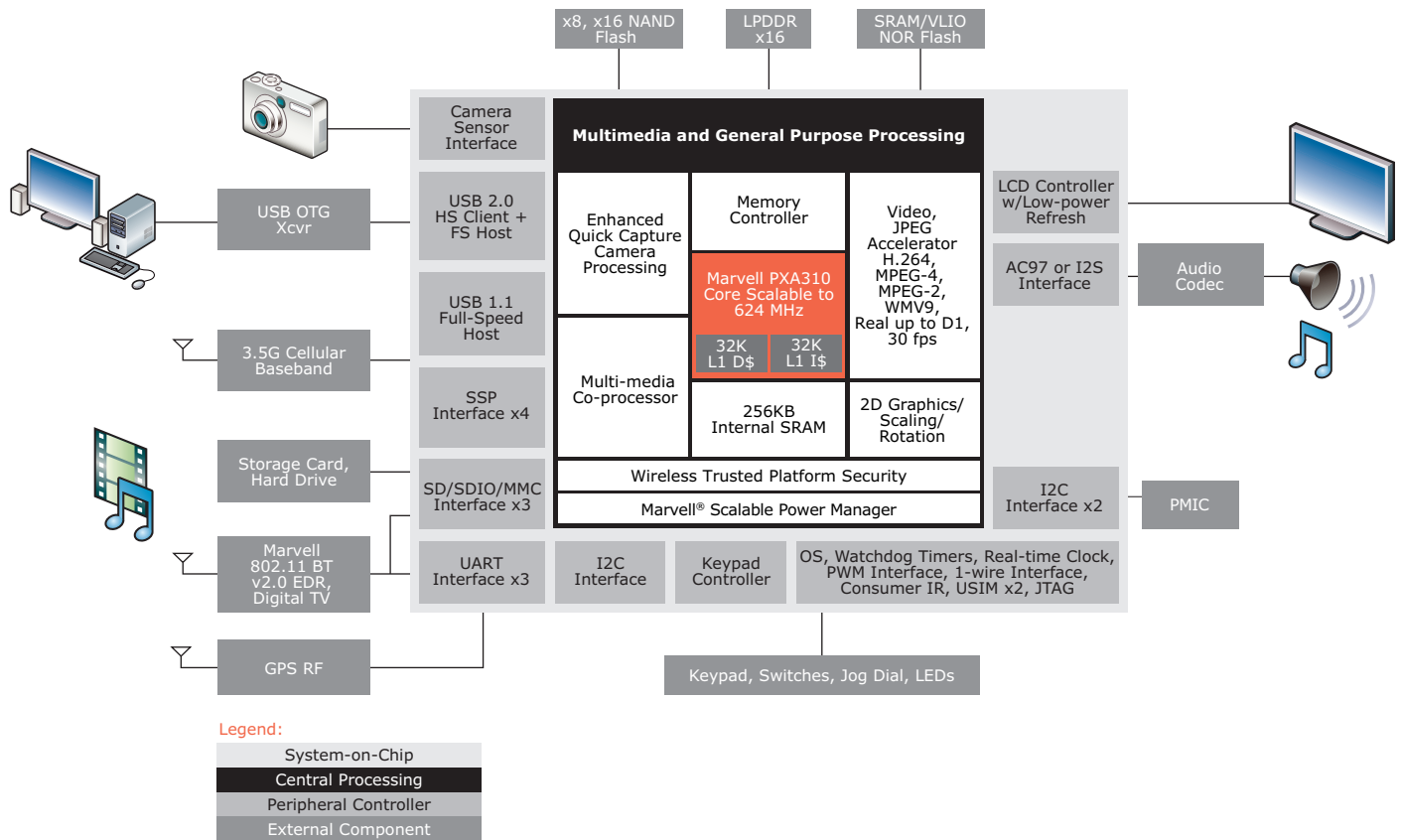
▶ **ENTERPRISE-CLASS SECURITY ACCELERATION**

Strong and fast security processing is one of the most critical functions needed today for supporting new consumer services, securing enterprise Intranet access and applications, and protecting a wireless service provider's own network. The PXA310 processor integrates the Marvell® Wireless Trusted Module (WTM), a comprehensive hardware security solution that can deeply bury encryption keys—the root of all computing security—behind an almost inaccessible physical security boundary, while concurrently ensuring that encrypted content does not bog a system down. Today, most software solutions store keys in highly accessible flash and expose them while being used. This is an inherently insecure solution that consumes general-purpose headroom, reducing battery life and often creating a sluggish user experience.

Features of the Wireless Trusted Module:

- Small off-core de-encryption/encryption engines run multiple concurrent DRM/VPN streams in parallel with other core processing tasks, providing additional headroom and extending media playback and VPN-general-use battery life.

- A secure boot ROM with trusted boot and code verification protects against malware, and when combined with hash verification enables extremely strong IMEI binding and SIM lock and provides for highly secure firmware over-the-air (FOTA) updates.

- User-friendly, cost-effective two-factor authentication provides true enterprise VPN access. In addition, handheld devices can gain access to the corporate intranet and line-of-business software just as easily and securely as notebooks.

Marvell also provides secure flash and platform software to enable the WTM for a complete platform solution.

PXA310 System-on-Chip Block Diagram

Legend:

System-on-Chip
Central Processing
Peripheral Controller
External Component

ABOUT THE PXA3xx PROCESSOR FAMILY

The PXA3xx 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 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.

▶ PXA310 PROCESSOR KEY FEATURES

FEATURES	BENEFITS
• Scalable core up to 624 MHz	• Provides burst-processing when needed, and headroom for multitasking applications and processing enhancements. Helps complete tasks sooner for a better end-user experience in computing tasks such as Web2.0 content rendering, file compression, and application launch.
• 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.
• Hardware video acceleration	• Supports up to D1 decode and encode performance for codecs including H.264, MPEG-4, H.263, MPEG-2, RealVideo and Microsoft WMV9. Supports simultaneous encode/decode up to CIF resolution for 3.5G video telephony. Hardware unit for scaling and rotation and other raster graphics operations.
• Multimedia acceleration with Intel® Wireless MMX™ 2 technology	• Support for audio and other multimedia processing via SIMD co-processor.
• Marvell Wireless Trusted Module	• Provides protection for consumers, operators, and content providers. Helps security and manageability of handsets for enterprise markets. Offloads security processing tasks from core.
• Code compatibility	• Improves TTM by allowing manufacturers to reuse applications written for PXA or ARM-compliant processors. 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 NAND controller, USB 2.0 high-speed device, and Quick Capture Interface, 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 EDR, and other peripherals. Supports a wide variety of camera sensors with up to 5 MP resolution with a hardware preprocessing chain for various sensors to reduce CPU loading.
• Stacked memory	• PoP SKUs reduce board real-estate sizes for sleek, thin form-factor designs.

▶ 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.

PXA310-003   5/08