AMCC

PowerPC 405EX
Embedded Processor

The PPC405EX combines the proven performance of the market leading PPC405 processor with a high performance suite of peripheral and memory interfaces, including PCI Express, USB2.0 On-the-Go, DDR 2/1 and Gigabit Ethernet. The PPC405EX also incorporates an advanced security engine, featuring header/trailer processing capability and support for the broadest range of security protocols, including IPSec, SSL, and DTLS. The PPC405EX is ideally suited for the next generation WLAN applications that require exceptional performance, small footprint and low power.

PowerPC ™

Benefits

• Superior Price/Performance for Cost Sensitive Wireless Access Applications

• Delivers 333 MHz to 667MHz performance (506 to 1014 DMIPs)

• Dual 1-lane PCI Express ports

• Supports up to 2 GBytes of DDR 2/1 DRAM

• High performance Security Engine supports IPSec, SSL, DTLS and SRTP (optional)

• Two 10/100/1000 Ethernet MACs

• On-the-Go USB 2.0 port

• 8/16/32-bit External Peripheral Bus Controller

• Two UARTs (UART0 with full hardware modem flow control),

• 32 General Purpose I/Os

• Low power dissipation, small form factor for high-density, power-conscious applications

The PowerPC 405 Core

The PowerPC 405 core has been optimized for system-on-a-chip designs requiring solid performance, low power and a competitive price. Featuring separate instruction and data caches on chip, as well as a 5-stage pipeline architecture, the 405 boosts performance by performing most single cycle execution of most instructions, including loads and stores.

Security

The PPC405EX integrates the advanced EIP-94 security engine from SafeNet. This security engine attaches directly to the PLB4 bus for the fastest possible throughput between the PPC405 processor, memory, and the security engine itself. The engine supports DES, 3DES, AES, and ARC-4 encryption, MD-5, SHA-1 and SHA-256 hashing. The packet engine includes a pseudo random number generator. The header/trailer protocol processor eliminates any need for security protocol processing by the PPC405 processor, freeing it to handle application-based operations, while improving overall security performance. The engine incorporates an on-chip true random number generator and a public key accelerator. The algorithms are compliant with FIPS-140-2 and ANSI X9.17 Annex C.

DDR Memory Support

To ensure design flexiblility, both DDR1 and DDR1 memory are supported at a maximum data rate of 400Mbps for DDR2 1.8V modules in either x32 for high performance applications or x16 modules for price sensitive applications.

Ethernet Interface MACs

To ensure that the system level throughput to the wired infrastructure can keep pace with the much faster 802.11n data rates, the PowerPC 405EX is equipped with dual gigabit Ethernet MACs that are compliant with ANSI/EEE std 802.3 and IEEE 802.3u supplement. Each gigabit MAC is compliant with IEEE standard 802.3z. (Gigabit Ethernet), and supports both half Duplex and Full Duplex operations, as well as Wake On LAN support. In addition, they support 9KB Jumbo frames, GMII, MII, and RGMII interfaces.

USB2.0 On-the-Go

Able to support either device or host modes, with data rates of up to 484Mbps, this general purpose interface can accommodate either hard disks, printer or any number of new IT devices.

External Bus Controller (EBC)

EBC operates at up to 100MHz. It provides 8-, 16- or 32-bit data bus, 27-bit address bus, 4 chip selects, and bus arbitration for ample space and flexibility for large amounts of RAM, nonvolatile memory, and external peripherals/ASICs. Both simple and multi-master configuration systems can be built.

Standard Peripherals

The PowerPC405EX offers an array of standard on-chip peripherals. Two UARTs (one with full hardware modem flow control), watchdog timer, and a 4-channel DMA controller capable of transferring data to/from any PLB and OPB slave, and external bus.

Development Tools Support

PowerPC embedded processors are supported by AMCC and 100+ third-party vendors through the PowerPC Embedded Tools program. This program provides compilers, debuggers, real-time operating systems, emulators, logic analyzers, and a full range of tools to help manufacturers develop products more quickly. A PowerPC405EX evaluation board kit is available to help expedite product evaluation and project development.

PCI Express

To be ready for the next generation of 802.11n wireless access devices, the 405EX features dual 1-lane PCI Express ports. With greater bandwidth, PCI Express is the preferred choice for high throughput WLAN access Points, Gateways and IP Set Top Boxes. Each PCI Express port can support 2.5 Gb/s per lane (2Gb/s data due to 8b/10b coding).
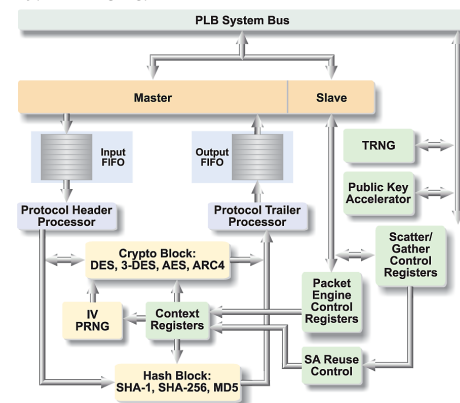
BUILT ON

Power ™

PowerPC 405EX

Dual Bus Architecture

The 405EX features two on-chip buses: a processor local bus (PLB) as well as an on-chip peripheral bus (OPB). High speed peripheals, such as PCI Express, DDR2 and the Security Engine connect directly to the 128-bit, PLB4 bus up to 200MHz. Less demanding devices are connected to the 32-bit OPB Bus up to 100MHz. An external peripheral controller supports the NAND and NOR flash memory as well as slave peripheral devices.

PowerPC Partners Ecosystem

AMCC's embedded PowerPC processors are supported by an extensive ecosystem of products and services from a wide range of leading suppliers. AMCC's PowerPC Partners program includes industry-standard providers of:
• Embedded operating systems
• Hardware and software development tools
• Embedded software products and services
• Board-level products
• System design services
• Technical training.

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit ***http://www.amcc.com/Embedded/Partners***
AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board, sample applications, and other software.

Features

• Processor Speed (frequency): From 333 to 667MHz
• Performance: 1.52 DMIPs/MHz (1014 DMIPS @ 667 MHz peak)
• Dual 1-lane PCI Express ports
• Supports up to 2 GBytes of DDR 1/2 DRAM
• High performance Security Engine supports IPSec, SSL, DTLS and SRTP (optional)
• DMA Controller with four independent channels
• Two 10/100/1000 Ethernet MACs with MAL DMA support
• 8/16/32-bit External Peripheral Bus Controller
• 2 UARTs (one with full hardware modem flow control)
• 32 GPIOs
• NAND Flash Controller
• Universal Interrupt Controller: 10 external interrupts
• On-the-Go USB 2.0 port
• JTAG and realtime trace support in processor core
• RoHS compliant (lead-free) version available

For more information, please visit ***http://www.amcc.com.***

Specifications

Technology
• 90nm CMOS Process

Performance (estimated)
• 506 Dhrystone 2.1 MIPS @ 333 MHz
• 1014 Dhrystone 2.1 MIPS @ 667 MHz

Frequency
• CPU: 667 MHz Maximum
• PLB: 200 MHz Maximum
• OPB: 100 MHz Maximum
• External Bus: 100 MHz Maximum

Power Dissipation
• 1.7W typical

Case Temperature Range
• -40°C to +85°C

Power Supply
• 1.2V (internal logic), 1.8V (DDR2), 2.5V (DDR1, Ethernet), 3.3V (1/0)

Packaging
• 388-pin E-PBGA 27mm × 27mm (with 1mm ball pitch)

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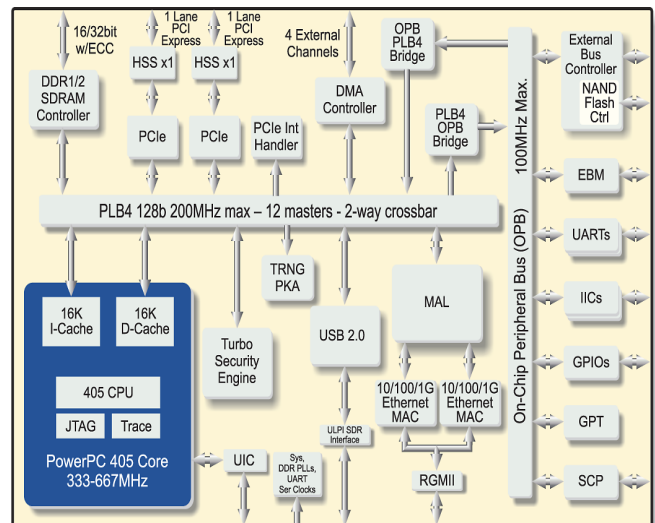
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