PowerPC 440GR

Embedded Processor

Benefits

- Delivers 333 MHz to 667 MHz performance (CPU)
- NAND Flash support
- Extensive connectivity by means of on-chip Ethernet, UARTs, IIC, SPI and PCI
- Offers low-power dissipation and small form factor for high-density and power-conscious applications

With speeds of up to 667 MHz, support for DDR memory, Ethernet and NAND flash interfaces, low power dissipation and a small footprint, the PowerPC 440GR embedded processor is ideally suited to a wide range of high-performance applications, including networking and storage.

The 440GR is an excellent choice for 405xx users requiring additional performance or looking to upgrade to DDR memory.

The PowerPC 440 Core

To enhance overall throughput, the PowerPC 440 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32-Kbyte data cache and 32-Kbyte instruction cache are 64-way set-associative. Versatile configurations enhance performance tuning while optional parity protection preserves data integrity. For additional system performance, the PowerPC 440 core includes dynamic branch prediction and 24 digital signal processing (DSP) instructions, as well as non-blocking caches that can be managed in either write-through or write-back mode.

High Speed Bus Architecture

Offering a peak bandwidth of 4.2 Gbytes/s and separate read and write data buses — the PowerPC 440GR's processor local bus (PLB) provides a high-bandwidth connection between the processor core and memory controller. Less demanding I/O devices are served by a 30-bit on-chip peripheral bus (OPB).

Extensive Memory Support

An on-chip double data rate (DDR) SDRAM controller provides a 32-bit memory interface with optional error checking and correcting (ECC) and a 1.1-Gbyte/s peak data rate. It supports four memory banks of up to 256 Mbytes each, for a maximum capacity of 1 Gbyte. An integrated NAND Flash controller allows up to four banks of Flash memory devices to be connected to the processor's external peripheral bus.

The Flash controller supports device densities up to 512 Mbytes, and optionally the SmartMedia card interface.

These devices can be accessed much like diskette drives, with available boot capability.

PCI Interface

The PowerPC 440GR offers a 32-bit PCI V2.2 interface and supports frequencies of up to 66 MHz. Multiple read prefetch and write post buffers enhance throughput, while the ability to boot the processor from PCI bus memory increases functionality.

Dual Ethernet Ports

For extensive connectivity options, the 440GR offers two integrated 10/100 Ethernet ports.

Standard Peripherals

The PowerPC 440GR offers two serial ports, support for up to 64 general-purpose I/O (GPIO) and two IIC controllers. A serial peripheral interface (SPI), also referred to as a serial communications port (SCP), allows full-duplex, synchronous data exchanges with other serial devices. The 440GR also supports up to four UARTs in a variety of configurations. A JTAG interface is provided for debugging purposes.

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 as well as sample applications and other software.

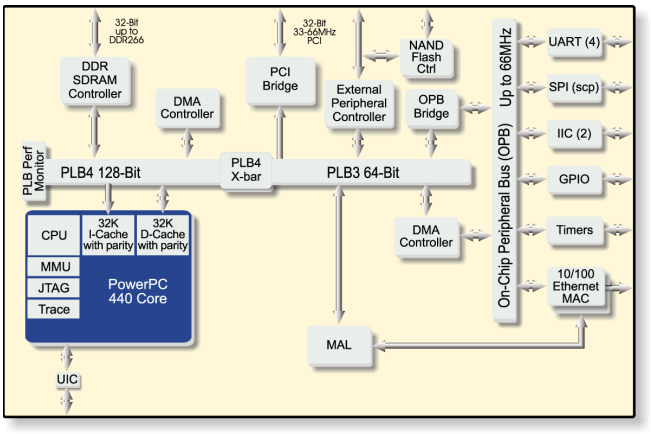
PowerPC 440GR

Features

- Speed (frequency): 333 MHz to 667 MHz
- Performance: 2.0 DMIPS/MHz (1,334 DMIPS @ 667 MHz peak)
- NAND Flash controller
  - Supports one to four banks of NAND Flash memory devices
  - Direct interfacing to discrete NAND Flash devices (up to four devices) and SmartMedia Card socket (22 pins)
  - 4-Mbyte to 256-Mbyte device sizes supported
  - 512-byte +16-byte or 2-Kbyte +64-byte device page sizes supported
- DMA support allows direct, no processor-intervention block copy from NAND Flash out to SDRAM; boot-from-NAND supported
- On-chip double data rate (DDR) SDRAM controller with 32-bit interface, 13-bit addressing, 1.1-Gbyte/s peak data rate and optional ECC
- Support for four banks of DDR SDRAM memory of up to 256 Mbytes each, maximum capacity of 1Gbyte
- Support for 64-, 128-, 256-, and 512-Mbyte DDR devices, with CAS latencies of 2, 2.5, or 3
- 32-bit PCI V2.2, 3.3 V interface supporting frequencies of up to 66 MHz
- Two Ethernet 10/100 Mbit/s, full-duplex MAC (1xMII or 2xRMII)with packet reject interface support; memory access layer (MAL) provides DMA capability to both Ethernet channels
- Up to four serial port UARTs (1 x 8-pin, or 2 x 4-pin, or 4 x 2-pin, or 1x4-pin and 2 x 2-pin)
- Two IIC interfaces (with one integrated boot strap controller)
- One serial port interface (SPI) 4-channel DMA – available for internal and external use
- Programmable interrupt controller with 10 external inputs, 64 internal inputs
- Programmable timers
- General-purpose I/O (64)
- Support for JTAG board testing, JTAG debuggers, and 4xx instruction trace interface
- RoHS compliant version available (lead-free)
- For more information, please visit ***http://www.amcc.com.***

Specifications

Technology
• 0.13 µm CMOS
Performance (estimated)
• 666 Dhrystone 2.1 MIPS @ 333 MHz
• 1,334 Dhrystone 2.1 MIPS @ 667 MHz
Frequency
• CPU: 333 MHz to 667 MHz
• Memory: 32-bit width: 800 Mbytes/s (DDR200) to 1.1 Gbytes/s (DDR266)
• PCI: 33 MHz to 66 MHz
Typical Power Dissipation (application dependent)
• 2.2W @ 333 MHz
• 2.3W @ 400 MHz
• 2.5W @ 533 MHz
• 3.1W @ 667 MHz
Case Temperature Range
• -40° to +100° C
Power Supply
• 1.5 V (logic), 2.5 V (SDRAM/Ethernet), 3.3 V (PCI, other I/O)
Signal I/Os
• 283
Packaging
• 456-ball E-PBGA, 35 mm x 35 mm (with 1.27-mm pad pitch) Available in both leaded and lead-free (RoHS compliant)



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