A **High-Performance / Low-Power**
MIPS® SoC with PCI Controller

Overview

The RMI Alchemy™ Solutions Au1500® processor provides a high-performance, low-power System-on-a-Chip (SoC) for the Internet Edge device market. These devices include thin clients, Web servers, routers, printers, wired and wireless gateways, wireless access points, handheld computing, Web pads, set-top boxes, and multimedia applications.

Product Description

The Au1500 processor delivers a complete SoC based on the MIPS32® instruction set. Designed for optimum performance at a very low power, the Au1500 processor is available up to 500MHz. Power dissipation measures less than 0.7 watt for the 400MHz version. With highly-integrated features (on-chip memory controllers, a 66MHz PCI 2.2 controller, and Internet access peripherals), the Au1500 processor runs a variety of operating systems, including Windows® CE.NET, Linux, and VxWorks. Moreover, the integration of peripherals, with RMI's unique, very high-performance MIPS-compatible core, can provide lower system costs, smaller form factors, lower system power requirements, simpler designs at multiple performance points, and shorter design cycles.

## Features

High-Speed MIPS® CPU Core

- 333, 400 or 500MHz
- MIPS32 Instruction Set
- 32-bit Architecture
- 6KB Instruction and 16KB Data Caches
- High-speed Multiply-Accumulate (MAC) and Divide Unit
- 1.5–1.8V Core, 3.3V I/O

Highly-Integrated System Peripherals

- 33/66MHz 32-bit PCI Controller (PCI 2.2 Compliant)
- GPIO (39 total, 22 dedicated for system use)
- Two 10/100 Ethernet Controllers
- USB Device and Host
- Two UARTs
- AC97 Controller
- PCMCIA Interface Controller

High Bandwith Memory Buses

- 100/125MHz SDRAM Controller
- SRAM/Flash EPROM Controller
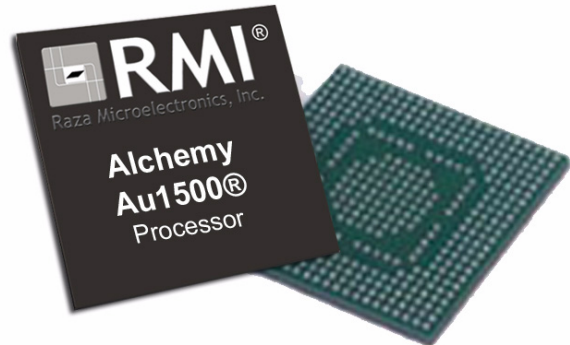
Low System Power

Core MHz	Power
333	<400mW
400	700mW
500	1.2W

- Power-saving Modes
  — Idle
  — Sleep
- Pseudo-static Design to 0Hz

Package

- 424-pin PBGA
- 19mm x 19mm

Operating System Support

- Microsoft® Windows CE.NET
- Linux
- VxWorks

Development Tool Support

- MIPS32-compatible Tool Set
- Numerous Third-Party Compilers, Assemblers and Debuggers

Core Microarchitecture Highlights Pipeline

- Scalar 5-stage Pipeline
- Load/Store Adder in I-stage
- Scalar Branch Techniques Optimized
- Pipelined Register File Access in Fetch Stage
- Zero Penalty Branch
- 16KB Non-Blocking Data Cache
- 16KB Instruction Cache

Raza Microelectronics, Inc.

Internet Edge Processor

Multiply-Accumulate (MAC) and Divide Unit

- Max Issue Rate of one 32x16 MAC per Clock
- Max Issue Rate of one 32x32 MAC per Every Other Clock
- Operate in Parallel to CPU Pipeline
- Executes all Integer Multiply and Divide Instructions
- 32x16-bit MAC Hardware

MMU

- Instruction and Data Watch Registers for Software Breakpoints
- Separate Interrupt Exception Vector
- TLB
  — 32 Dual-entry, Fully Associative
  — Variable Page Sizes 4KB–16MB
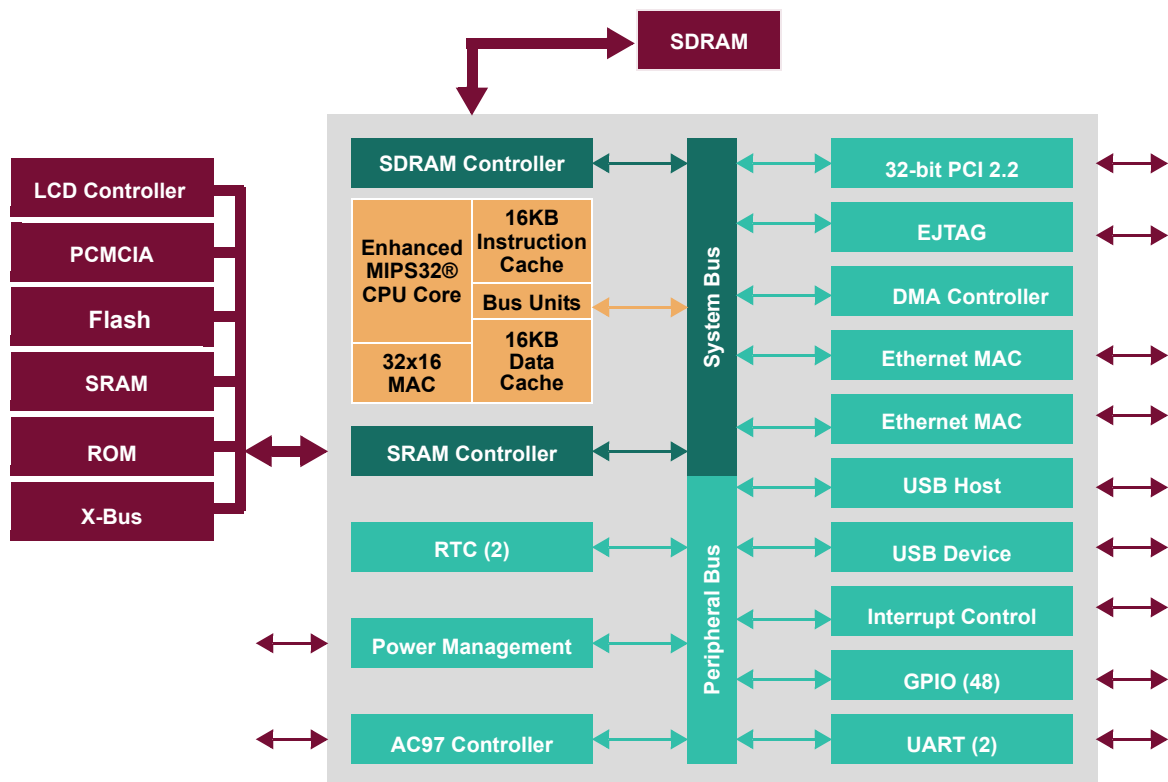 — 4-entry ITB

PCI

- PCI 2.2 Compliant Core
- Configurable as Host or Satellite
- 32-bit Address/Data Bus
- 33MHz/66MHz Source or Sink Clock
- PCI Boot Supported

EJTAG Support

- Revision 2.5
- Probes Availability from Major Vendors

Low Power Consumption

Core MHz	Core Voltage	Power
333	1.5	<400mW
400	1.5	700mW
500	1.8	1.2W

About RMI

Raza Microelectronics, Inc. (RMI®) is a fabless semiconductor company providing highly-integrated feature-rich products ranging from power-optimized System-on-a-Chip (SoC) solutions to High-Performance Processors for the Digital Consumer, Wireless, Networking and Security markets. RMI offers the most advanced and most complete MIPS-Based™ processing solutions with both 32/64-bit architectures supporting frequencies from 300MHz to 1.2GHz. The company is headquartered in Cupertino, CA with offices in Texas, India, Korea, Japan and China. More information about RMI can be found on the company's website at www.RazaMicro.com