



## Entry-Level ARM9™ System-on-Chip Processor

### High-Performance ARM920T Design Ideal for Broad Range of Applications

#### EP9301

The EP9301 is one of the most attractively priced ARM9 processors in the world. Its high-performance design is ideal for a multitude of entry-level consumer and industrial electronic products. Designers of Internet radios, point-of sale terminals, industrial and building controls, jukeboxes, telematic control systems, set-top boxes, biometric security systems, lottery

machines, fitness equipment, security systems, networked camera, MP3 mixer, GSM modem and VOIP will benefit from the EP9301's integrated architecture and advanced features. In fact, with amazingly agile performance provided by a 166 MHz ARM920T processor, and featuring a wide breadth of peripheral interfaces, the EP9301 is well suited to an even broader

range of high volume applications. Furthermore, by enabling or disabling the EP9301's peripheral interfaces, designers can reduce development costs and accelerate time to market by creating a single platform that can be easily modified to deliver a variety of differentiated end products.

#### EP9301 FEATURES

- **166 MHz ARM920T Processor**
  - 16 KB data cache and 16 KB instruction cache
  - MMU enabling Linux® and Windows CE®
  - 66 MHz system bus
- **MaverickKey™ IDs for Digital Rights Management or Design IP Security**
  - 32-bit unique ID
  - 128-bit random ID
- **Integrated Peripheral Interfaces**
  - Five input A/D with 12-bit resolution
  - 1/10/100 Mbps Ethernet MAC
  - Two-port USB 2.0 Full Speed host (OHCI)
  - Two UARTs (16550 Type), including soft modem support
  - IrDA interface, slow mode
  - SPI™ port
  - AC'97 interface
  - I<sup>2</sup>S interface
- **External Memory Options**
  - 16-bit SDRAM interface, up to two banks
  - 16/8-bit SRAM/Flash/ROM I/F
  - Serial EEPROM interface
- **Internal Peripherals**
  - Real-Time clock with software trim
  - 12 DMA channels for data transfer that maximizes system performance
  - Boot ROM
  - Dual PLLs control all clock domains
  - Watchdog timer
  - Two general purpose 16-bit timers
  - General purpose 32-bit timer
  - 40-bit debug timer
- **General-Purpose I/Os**
  - 16 enhanced GPIOs including interrupt capability
  - 8 additional optional GPIOs multiplexed on peripherals

## Applications

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- Internet radios
- Point-of-sale terminals
- Industrial and building controls
- Jukeboxes
- Telematic control systems
- Set-top boxes
- Biometric security systems
- Lottery machines
- Fitness equipment
- Security systems
- Networked camera
- MP3 mixer
- GSM modem
- VOIP

## OVERVIEW

### High-Performance ARM920T Processor Core

The EP9301 features an advanced ARM920T processor design with an MMU that supports Linux®, Windows CE® and many other embedded operating systems. The ARM920T's 32-bit microcontroller architecture, with a five-stage pipeline, delivers impressive performance at very low power. The included 16 KB instruction cache and 16 KB data cache provide zero-cycle latency to the current program and data, or can be locked to provide guaranteed no-latency access to critical instructions and data. For applications with instruction memory size restrictions, the ARM920T's compressed Thumb® instruction set provides a space-efficient design that maximizes external instruction memory usage.

### Integrated Five-Input, Multiplexed A/D Controller

The EP9301 integrates a signed 12-bit analog-to-digital converter with a multiplexed front-end that is controlled through a software-configured switch matrix. This matrix allows routing of the five input signals to the A/D sample input or to the +REF and -REF inputs. If external REF inputs are not required, the A/D REF inputs can be internally switched to VDD and GND allowing all five inputs to be sampled. Reading a sampled result enables a convert command for the next sample. These capabilities are especially useful in process control and instrumentation applications as well as voltage or temperature monitoring.

### MaverickKey™ Unique ID Secures Digital Content and OEM Designs

MaverickKey unique hardware programmed IDs provide an excellent solution to the growing concern over secure Web content and commerce. With Internet security playing an important role in the delivery of digital media such as books or music, traditional software methods are quickly becoming unreliable. The MaverickKey unique IDs provide OEMs with a method of utilizing specific hardware IDs for DRM (Digital Rights Management) mechanisms.

Both a specific 32-bit ID as well as a 128-bit random ID is programmed into the EP9301 through the use of laser probing technology. These IDs can then be used to match secure copyrighted content with the ID of the target device that the EP9301 is powering, and then deliver the copyrighted information over a secure connection. In addition, secure transactions can benefit by matching device IDs to server IDs.

MaverickKey IDs can also be used by OEMs and design houses to protect against design piracy by presetting ranges for unique IDs. For more information on securing your design using MaverickKey, please contact your Cirrus Logic sales representative.

## Integrated Two-port USB 2.0 Full Speed Host with Transceivers

The EP9301 integrates two USB 2.0 Full Speed host ports. Fully compliant to the OHCI USB 2.0 Full Speed specification (12 Mbps), the host ports can be used to provide connections to a number of external devices including mass storage devices, external portable devices such as audio players or cameras, printers, or USB hubs. Naturally, the two-port USB host also supports the USB 2.0 Low Speed standard. This provides the opportunity to create a wide array of flexible system configurations.

## Integrated Ethernet MAC Reduces BOM Costs

The EP9301 integrates a 1/10/100 Mbps Ethernet Media Access Controller (MAC) on board. With a simple connection to an MII-based external PHY, an EP9301-based system has easy, high-performance, cost-effective Internet capability.

## High-Quality Sound Delivered in Multiple Audio Configurations

The EP9301 delivers SPI, I<sup>2</sup>S and AC'97 serial interface support. The AC'97 port supports multiple CODECs for cost-effective stereo audio output. Cirrus Logic provides high-performance audio decode and encode algorithms for a number of popular formats including MP3, Windows Media<sup>®</sup> Audio and AAC<sup>™</sup>.

## General-Purpose Memory Interface (SDRAM, SRAM, ROM, & FLASH)

The EP9301 features a unified memory address model in which all memory devices are accessed over a common address/data bus. The SDRAM memory controller supports 8- or 16-bit devices and accommodates an internal boot ROM concurrently with a 8- or 16-bit SDRAM memory.

## Multiple Booting Mechanisms Increase Flexibility

The processor includes a 16 KB boot ROM to set up standard configurations. Optionally, the processor may be booted from FLASH memory, over the SPI serial interface or through the UART. This boot flexibility makes it easy to design user-controlled, field-upgradable systems.

## Abundant General Purpose I/Os Build Flexible Systems

The EP9301 includes both enhanced and standard general-purpose I/O pins (GPIOs). The 16 different enhanced GPIOs may individually be configured as inputs, outputs or interrupt-enabled inputs. There are an additional 8 standard GPIOs that may individually be used as inputs, outputs or open-drain pins. The standard GPIOs are multiplexed with peripheral function pins, so the number available depends on the utilization of peripherals. Together, the enhanced and standard GPIOs facilitate easy system design with external peripherals not integrated on the EP9301.

## The Cirrus Logic ARM9™ Embedded Processor Family

EP9315

### Premium-Featured Solutions

Connected, high-performance graphics system  
with mass storage

EP9312

EP9307

### Full-Featured Solutions

Connected, high-performance graphics terminals

EP9302

EP9301

### Entry-Level Solutions

Non-graphical terminals, standard connectivity



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