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## Features

- AVR® Microcontroller-based USB Hub and Function Controller
- One Upstream Port Plus Four External and One Attached Downstream Ports
- USB Hub with Two Endpoints
- Embedded USB Function with 3 Endpoints
- 32 Programmable I/O Port Pins
- High-performance and Low-power AVR RISC Microcontroller
- 120 Powerful Instructions – Most with 83 ns Execution Cycle Times
- 128K Bytes Program Memory Address Range
- 512 Bytes Internal SRAM
- 32 x 8 General-purpose Working Registers
- Programmable UART and SPI Serial Interface
- One 8-bit Timer/Counter with Separate Prescaler
- One 16-bit Timer/Counter with Separate Prescaler
- External and Internal Interrupt Sources
- Programmable Watchdog Timer
- Low-power Idle and Power-down Modes
- Programmable 6/12 MHz Oscillator with PLL
- On-chip 3.3V Power Supply
- 100-pin LQFP Package

## Overview

The Atmel AT43320 is a microcontroller-based USB hub with an embedded function. The USB hub has five downstream ports, one of which is permanently attached. Internally the AT43320 consists of a USB hub and function interface, a hub repeater, and a high-performance, efficient 8-bit RISC microcontroller. The hub and peripheral device controller function is implemented in the microcontroller's firmware. To the USB host, the embedded function appears as an attached port of the hub with its own device address and endpoints. The AT43320 can also be configured as a USB function without the hub.

The USB hardware block consists of a USB transceiver, SIE, hub repeater, endpoint controllers, and an interface to the microcontroller. The USB hardware interfaces to the USB host at the transaction level. The CPU of the microcontroller is based on the Atmel AVR microcontroller and is capable of addressing up to 128K bytes of external program memory. The AVR architecture was developed to be programmed in C efficiently and with maximum performance.



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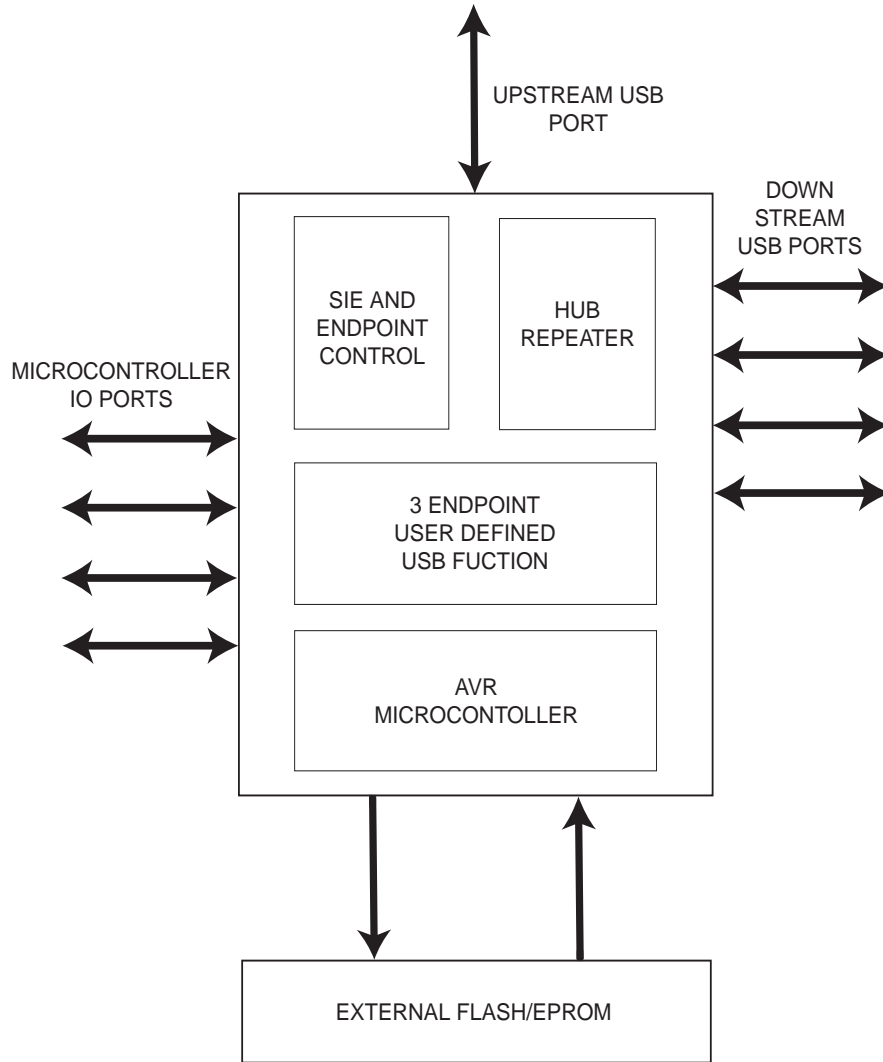
## Full-speed USB Hub/Function Microcontroller

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### AT43320



Figure 1. AT43320 Block Diagram

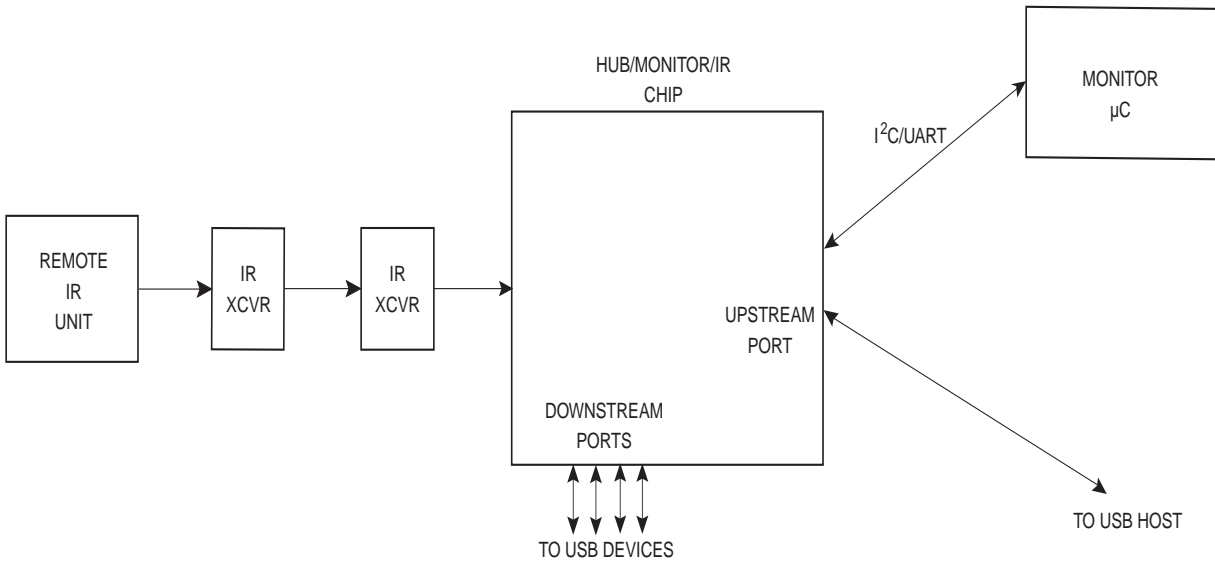


## Development Support

The AT43320 uses the same program and development tools as the Atmel AVR microcontrollers including: C compilers, macro assemblers, program debuggers/simulators,

in-circuit emulators. A USB development is also available including firmware source code for the most common USB applications.

**Figure 2.** Hub/Monitor/IR Chip Application





## Atmel Headquarters

### *Corporate Headquarters*

2325 Orchard Parkway  
San Jose, CA 95131  
TEL (408) 441-0311  
FAX (408) 487-2600

### *Europe*

Atmel U.K., Ltd.  
Coliseum Business Centre  
Riverside Way  
Camberley, Surrey GU15 3YL  
England  
TEL (44) 1276-686-677  
FAX (44) 1276-686-697

### *Asia*

Atmel Asia, Ltd.  
Room 1219  
Chinachem Golden Plaza  
77 Mody Road Tsimhatsui  
East Kowloon  
Hong Kong  
TEL (852) 2721-9778  
FAX (852) 2722-1369

### *Japan*

Atmel Japan K.K.  
9F, Tonetsu Shinkawa Bldg.  
1-24-8 Shinkawa  
Chuo-ku, Tokyo 104-0033  
Japan  
TEL (81) 3-3523-3551  
FAX (81) 3-3523-7581

## Atmel Operations

### *Atmel Colorado Springs*

1150 E. Cheyenne Mtn. Blvd.  
Colorado Springs, CO 80906  
TEL (719) 576-3300  
FAX (719) 540-1759

### *Atmel Rousset*

Zone Industrielle  
13106 Rousset Cedex  
France  
TEL (33) 4-4253-6000  
FAX (33) 4-4253-6001

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### *Fax-on-Demand*

North America:  
1-(800) 292-8635  
International:  
1-(408) 441-0732

### *e-mail*

[literature@atmel.com](mailto:literature@atmel.com)

### *Web Site*

<http://www.atmel.com>

### *BBS*

1-(408) 436-4309

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