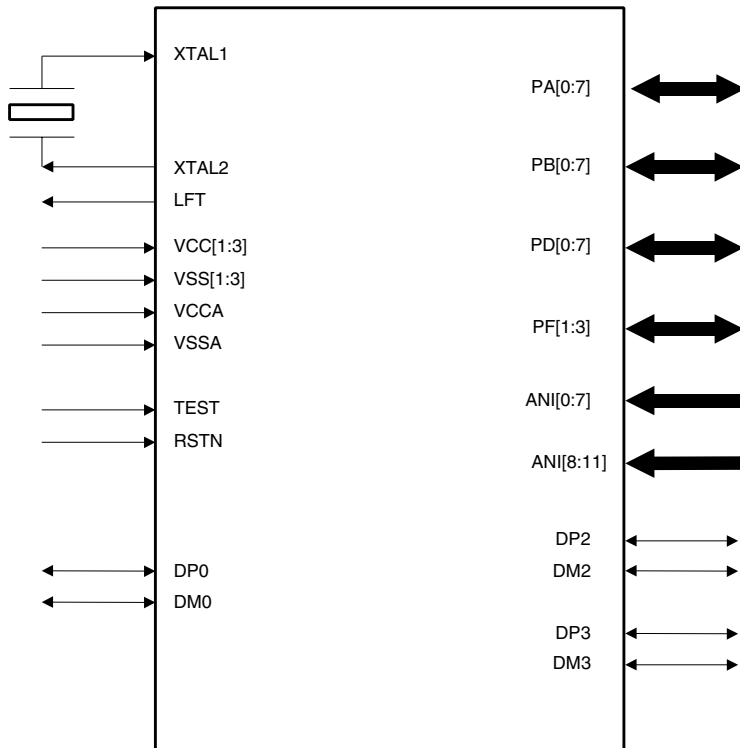


## Features

- AVR<sup>®</sup> Microcontroller-based USB Hub and Function Controller
- Fully Programmable USB 1.1 Hub with 2 External and 1 Attached Downstream Ports
- Full Speed USB Function with 4 Endpoints
- High-performance and Low-power AVR RISC Microcontroller
- 120 Powerful Instructions – Most with 83 ns Execution Cycle Times
- 24K Bytes Program Memory in Masked ROM or Downloadable SRAM
- 1K Byte Internal SRAM
- 32 x 8 General Purpose Working Registers
- 27 Programmable I/O Port Pins
- 12 Channels 10-bit A-to-D Converter
- Programmable SPI Serial Interface
- One 8-bit Timer Counter with Separate Pre-scaler
- One 16-bit Timer Counter with Separate Pre-scaler and Two PWM
- External and Internal Interrupt Sources
- Programmable Watchdog Timer
- Low-power Idle and Power-down Modes
- 6 MHz Crystal Oscillator with PLL
- 5V Operation with On-chip 3.3V Regulators
- 64-lead LQFP Package



## Full Speed USB Microcontroller with Embedded Hub, ADC and PWM

### AT43USB355

## Summary





## Overview

The Atmel AT43USB355 is a full speed USB AVR-based microcontroller with a USB 1.1 compliant embedded hub especially suitable for use in game controllers. The USB hub has 3 downstream ports, one of which is permanently attached to the USB function. The USB function controller has its own device address and endpoints. In game controller applications, the two external downstream USB ports can be used to connect other devices such as headphones sets for voice commands of games, Flash memory modules, or any other USB device.

The A-to-D converters have a minimum conversion time of 12  $\mu$ s that together with the 12-input channel should cover even the most demanding game controllers such as gamepads, joysticks and racing wheels. The two PWM outputs can be programmed for 8-, 9- or 10-bit resolution for applications requiring force feedback. The 27 general-purpose programmable I/O pins provide generous inputs for the various buttons and switches and LED indicators that are being used in increasing numbers in today's game controllers.

The USB hardware block consists of a USB transceiver, SIE, hub repeater, endpoint controllers, and an interface to the microcontroller. The USB hardware of the AT43USB355 supports the physical and link layers of the USB protocol while the transaction layer and hub controller functions must be implemented in the microcontroller's firmware. If the application does not require a hub, it can be disabled. The AVR architecture was developed to be programmed in C efficiently and without loss in performance.

There are two versions of the chip. The AT43USB355E has a SRAM program memory that is automatically loaded from an external serial Flash/EEPROM during power on reset. The AT43USB355M stores its firmware in a masked ROM. The two versions are pin and function compatible.

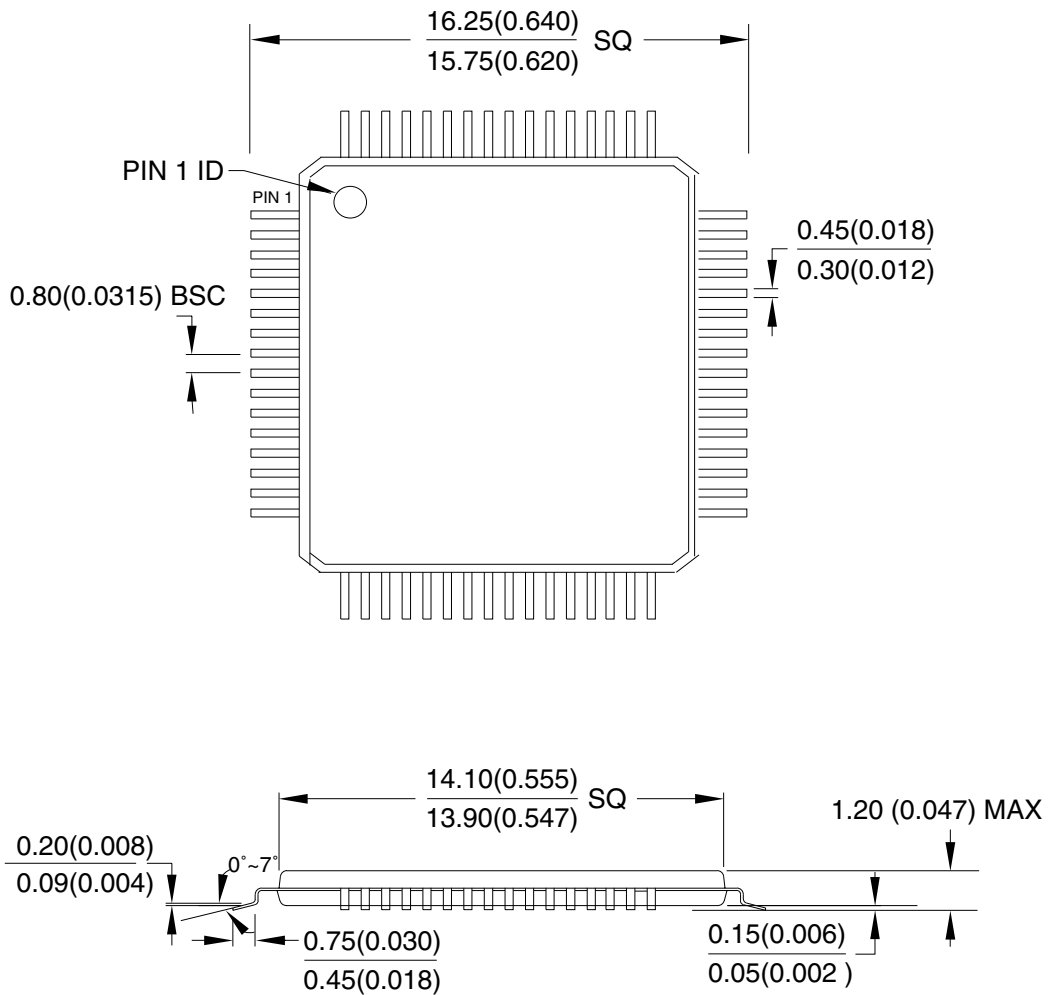
## Development Support

The AT43USB355 uses the same program and development tools as the Atmel AVR microcontrollers including: C compilers, macro assemblers, program debuggers/simulators, in-circuit emulators. A development kit is also available including firmware source code for the most common USB applications.

Packaging Information

64A – LQFP

64A, 64-lead, Thin (1.0 mm) Plastic Quad Flat Package (TQFP),  
 14 x14 mm Body, 2.0 mm Footprint, 0.8 mm Pitch.  
 Dimensions in Millimeters and (Inches)\*  
 JEDEC STANDARD MS-026 AEB



\*Controlling dimension: millimeter

REV. A 04/11/2001





## **Atmel Headquarters**

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

### *Europe*

Atmel SarL  
Route des Arsenaux 41  
Casa Postale 80  
CH-1705 Fribourg  
Switzerland  
TEL (41) 26-426-5555  
FAX (41) 26-426-5500

### *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 Product Operations**

### *Atmel Colorado Springs*

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

### *Atmel Grenoble*

Avenue de Rochepleine  
BP 123  
38521 Saint-Egreve Cedex, France  
TEL (33) 4-7658-3000  
FAX (33) 4-7658-3480

### *Atmel Heilbronn*

Theresienstrasse 2  
POB 3535  
D-74025 Heilbronn, Germany  
TEL (49) 71 31 67 25 94  
FAX (49) 71 31 67 24 23

### *Atmel Nantes*

La Chantrerie  
BP 70602  
44306 Nantes Cedex 3, France  
TEL (33) 0 2 40 18 18 18  
FAX (33) 0 2 40 18 19 60

### *Atmel Rousset*

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

### *Atmel Smart Card ICs*

Scottish Enterprise Technology Park  
East Kilbride, Scotland G75 0QR  
TEL (44) 1355-357-000  
FAX (44) 1355-242-743

---

### *e-mail*

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

### *Web Site*

<http://www.atmel.com>

### *BBS*

1-(408) 436-4309

### **© Atmel Corporation 2001.**

Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

ATMEL® and AVR® are the registered trademarks of Atmel.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.