

## ➤ **AVR32 UC3 Microcontrollers** Optimized for System Performance

- True 1.6V operation
- More MHz per mW
- Unrivalled DSP performance
- Peripheral DMA controller

[www.atmel.com/avr32](http://www.atmel.com/avr32)

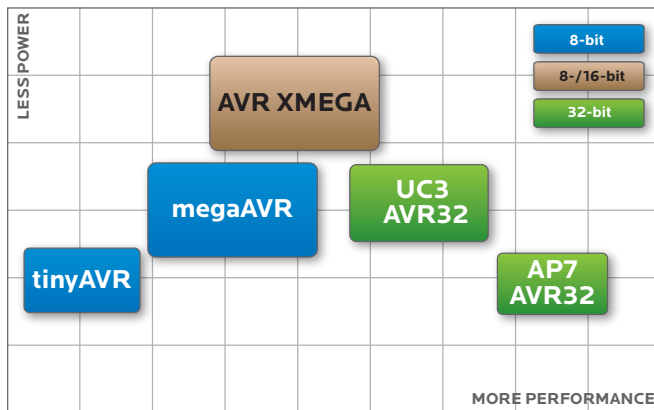


## Introducing the AVR Family

### High-Performance/Low-Power 8- to 32-bit Microcontrollers/Processors

#### AVR Devices — Success through Innovation

Atmel® offers a broad portfolio of 8- and 32-bit AVR®s. Since day one, the AVR philosophy has always been simple: highest performance with no power penalty.



Atmel offers a broad range of AVR micro-controllers:

- *tinyAVR*®, 1-16 KBytes Flash, 8- to 32-pin packages
- *megaAVR*®, 4-256 KBytes Flash, 28- to 100-pin packages
- *AVR XMEGA*™, 16-384 KBytes Flash, 44- to 100-pin packages
- *AVR32 UC3*, 16-512 KBytes Flash, 48- to 144-pin packages
- *AVR32 AP7*, 210 DMIPS throughput at 150 MHz, 196- to 256-pin packages

#### Leading the Way in High-Performance and Low-Power Consumption

The AVR32 UC3 delivers high computational throughput, deterministic real-time control, low power, low system cost, high reliability, and ease of use. The CPU includes leading-edge features such as DSP arithmetic, single-cycle multiply-accumulate instructions, and single-cycle SRAM access. In addition, a Peripheral DMA controller and multi-layer high-speed bus architecture make the UC3 core ideal for high-throughput applications. UC3 devices are perfectly suited for portable and battery-based applications thanks to their outstanding low-power properties.

#### AVR32 UC3 Highlights

- High computational performance
- Up to 1.5 Dhrystone MIPS/MHz
- True 1.6V operation
- Exceptional data throughput
- Multi-layer data buses
- Dual-port SRAM
- Peripheral Event System
- Peripheral DMA controller
- Memory to memory DMA
- Accurate and flexible clock system
- Automatic oscillator failure protection

#### Award-Winning Products

AVR32 UC3 Microcontrollers  
HW Product of the year 2008  
Embedded World (Germany)



AVR32 UC3 Microcontrollers  
Hot Products 2007  
EDN (USA)



AVR32  
Innovation of the Year 2007  
EDN (USA)



AVR32 Microcontrollers  
Product of the year 2006 & 2007  
Elektronik (Germany)

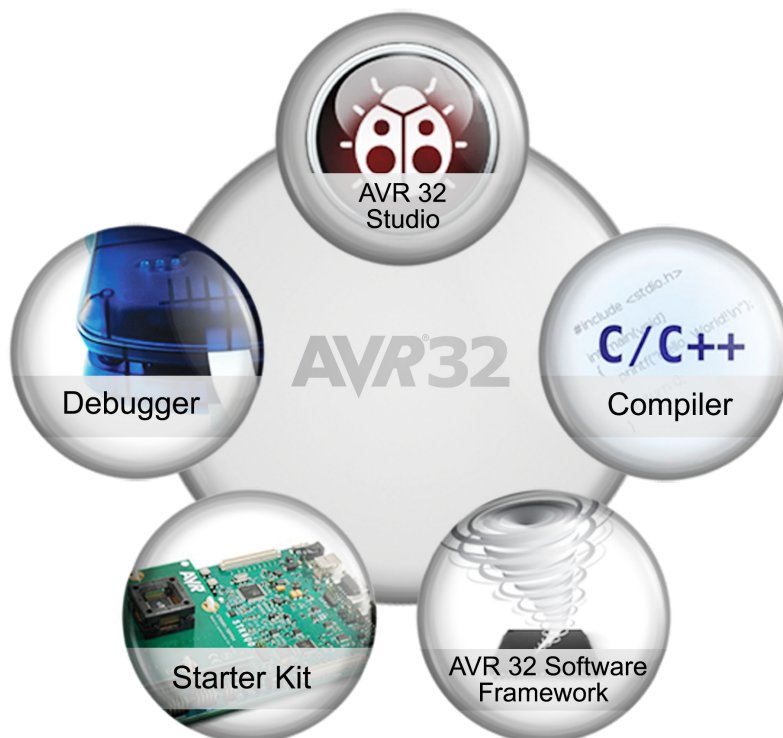


## Ease of Use

Seamless integration between devices, tools, software framework and support

### AVR32 Tools – Quality and Low cost

AVR32 UC3 microcontrollers benefit from the well-established AVR tools and software chain renowned for its quality and ease of use. Selecting the UC3 microcontroller will bring your application higher performance and lower power consumption, as well as a seamless ecosystem of source code libraries, development tools, documentation, and a large user community. All this will allow you to focus on building better products and bringing them to market faster. As an embedded developer you will find it easy to succeed with the AVR32 microcontrollers.



### Debugging and In-system Programming

AVR32 devices include a non-intrusive On-Chip Debug system that requires no device resources. This gives real-time access to all peripheral registers, data and program memories, and provides support for an unlimited number of break points. The AVR32 UC3 provides fast serial programming interfaces, including USB, for production line or in system programming. By including the bootloader found in the AVR32 Software Framework in a project, the UC3 can also receive flash upgrades in the field through virtually any interface without reset or halt of critical program execution. The serial number in each device eases implementation of safe crypto bootloaders, networking applications, authentication and life cycle product tracking.

### Documentation, Software and Support

From the smallest device to the highest performance processors, reference datasheets describing features and implementations are available at [www.atmel.com/avr32](http://www.atmel.com/avr32). Application notes and our unique free AVR32 Software Framework library make it easy to start development.

## AVR32 Software Framework

### Software that Releases the Superior AVR32 Performance

#### Library of C Source Code

The AVR32 Software Framework is a collection of production-ready source code written and optimized by Atmel application experts and tested in hundreds of production designs. Using these peripheral drivers, communication stacks and application-specific libraries is the quick and effortless way to release the superior AVR32 performance. The AVR32 Software Framework supports all AVR32 devices and development kits and is compatible with both AVR32 GNU Toolchain and IAR Embedded Workbench® compilers.

#### Drivers

##### Peripheral and CPU Drivers

A complete set of CPU and Peripheral drivers hide any device specific peripheral features below a standard set of Application Peripheral Interfaces (API) function calls to makes the migration between AVR32 devices quick and easy. Peripheral drivers include code used to initialize and service the clock system, I/O multiplexing, peripheral interrupts, DMA transfers and Peripheral Event System connections.

#### Components

##### External Peripherals

The AVR32 Software Framework contains drivers for popular off-chip components such as QTouch™ capacitive touch keyboards, LCD displays, SRAM/SDRAM/NAND Flash memories, SD/MMC storage cards, and audio amplifiers/codecs.



#### AVR32 Software Framework Contents

- Peripheral and CPU drivers
- Communication library
- USB/ TCP/IP/ Bluetooth®/ IEEE 802.15.4™
- Storage library
- NAND/ SD/ MMC/ Memory stick
- DSP library
- Audio library
- Security and encryption library
- Graphics Toolkit and library
- FAT filesystem
- External components library
- LCD/ Sensors/ Keyboards

#### Boards

##### Hardware Abstraction Layer

To simplify the process of writing code for a specific hardware board, the AVR32 Software Framework uses a Boards layer to describe the external hardware and configure the board specific multiplexing of peripheral functions through the AVR32 I/O pins. Replacing pin numbers by more logical names when addressing external hardware makes the source code easier to read, and also simplifies the process of migrating a project from one board to another.

## Services

### Floating Point and DSP Arithmetic

The AVR32 DSP Library is a complete set of math functions optimized in assembly by Atmel AVR32 experts.

### Communication Stacks

The AVR32 is built for very high speed communication, and the communications library contains complete communication stacks for USB, TCP/IP, and RF communication

- **USB stack:** Host or device configuration. Full support for popular classes including HID, Mass Storage, Audio, CDC serial port, and Device Firmware Upgrade
- **TCP/IP stack:** IP, TCP, UDP, ICMP, DHCP, PPP and ARP low level functions. FTP server, HTTP web server, SMTP client, and POP3 client
- **Bluetooth stack:** Will be added in 2009
- **IEEE 802.15.4 ZigBee PRO stack:** Will be added in 2009

#### DSP Library: 70 functions in 7 categories

- Basic filtering
- Operators
- Signal generation
- Transforms
- Vectors
- Windowing
- Advanced encoders and re-samplers

### Encryption Library

The AVR32 instruction set contains native support for encryption; a library of popular cryptographic functions for added security to any application. The source code is optimized in assembly by Atmel software experts for maximum speed and minimal size. The library contains AES, 3DES, ARC4, MD{2, 4, 5}, SHA-1, SHA-256, RSA1024, X.509, SSL version 3, and TLS version 1, and integrates seamlessly with other libraries such as the TCP/IP and USB communication stacks and memory card drivers.

### Audio Library

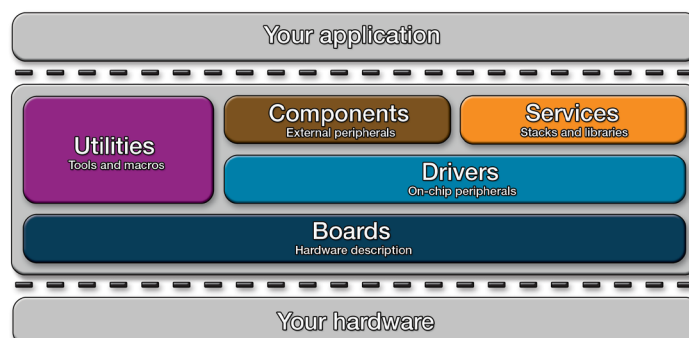
The Audio library contains software for decoding of popular audio formats, including MP3 and WMA. The audio library also includes support for docking audio players and the popular iPod® / iTouch / iPhone™ from Apple® via USB. The library will be expanded to support the OGG and AAC in 2009.

### Picture Library

This library is used for decoding and rescaling multiple picture formats including JPEG and BMP, and displaying them on an LCD screen.

### File System

The AVR32 includes FAT12/16/32 file system support. It is also optimized for seamless integration with USB mass storage devices and SD memory cards. The library is complete with example code demonstrating how to implement a memory abstraction layer, a file-based data logger, and a shell example across an RS232 line.



## AVR32 UC3 Flash Microcontrollers feature

- True 1.6V operation
- More MHz per mW
- Unrivalled DSP performance
- Peripheral DMA controller

## HIGHER CPU PERFORMANCE

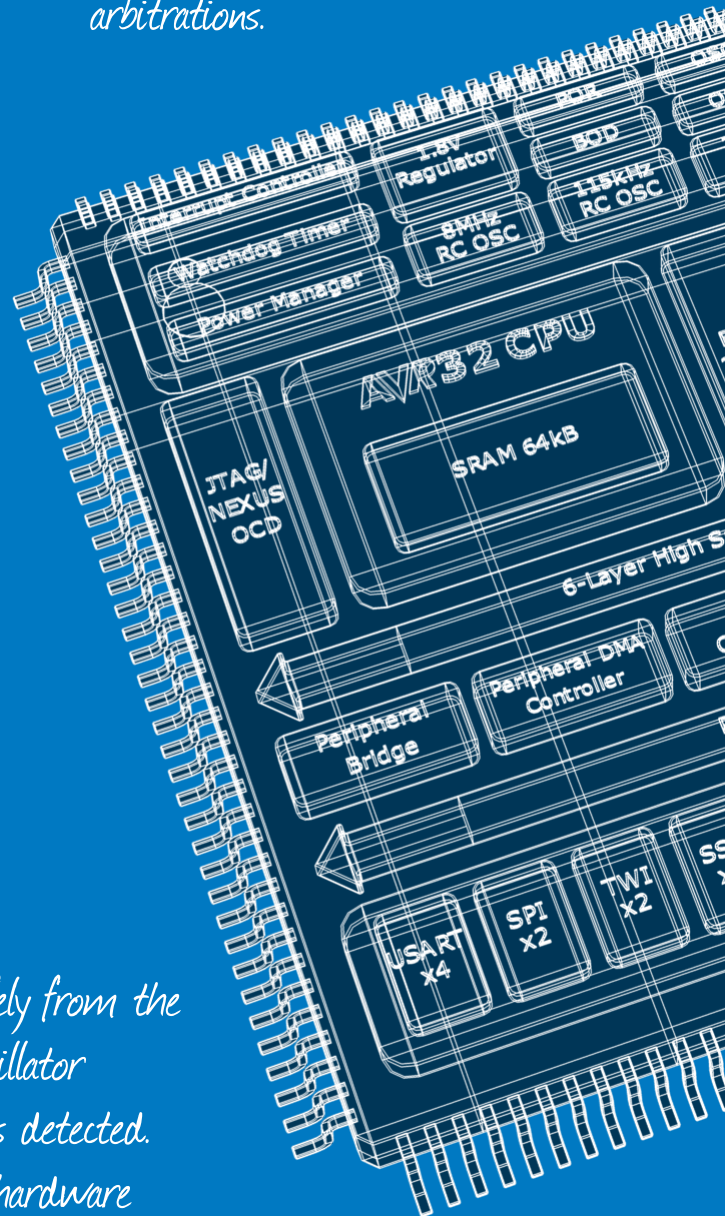
- The AVR32 CPU and its tightly coupled dual port SRAM allow fast computation without latencies from pipeline stalls or system bus arbitrations.

## DETERMINISTIC REAL-TIME CONTROL

- Fast context switches, atomic peripheral read-modify-write access and a fully autonomous Peripheral Event System allow predictable external event handling.

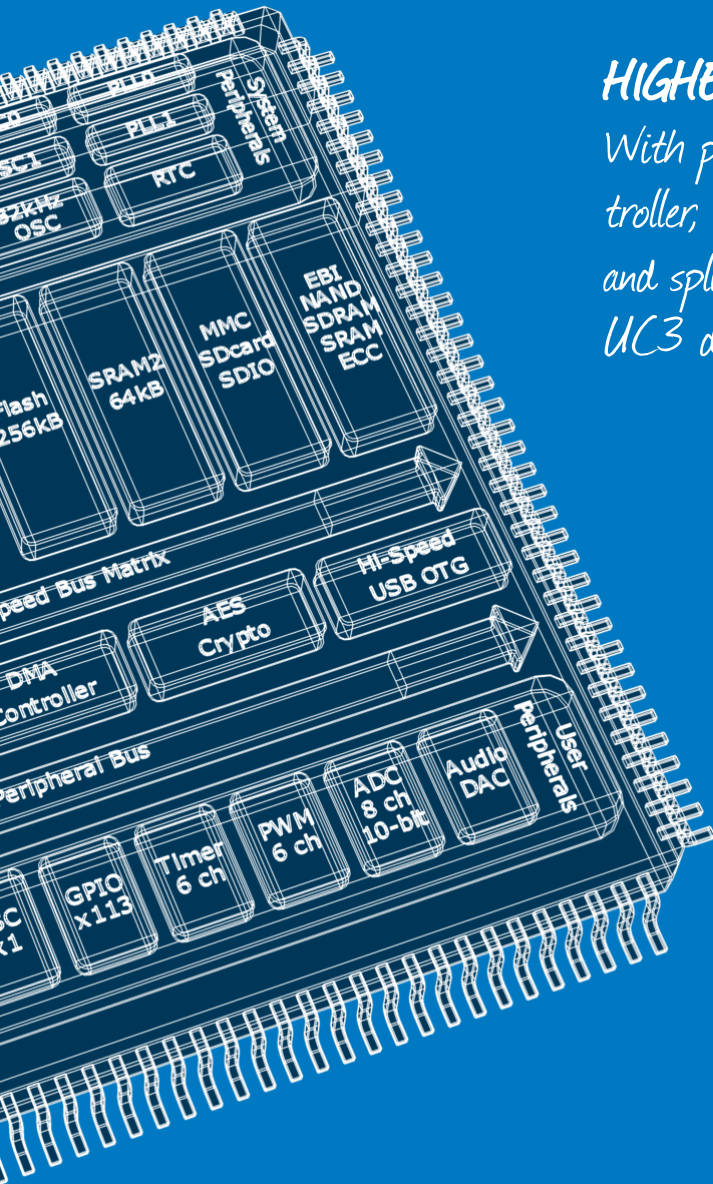
## HIGH RELIABILITY

- The AVR32 UC3 microcontrollers boot safely from the on-board RC oscillator, and return to RC oscillator operation if external crystal oscillator failure is detected. The brown-out detector and the windowed hardware watchdog protect the system from environmental malfunctions. The non-maskable interrupt ensures critical event handling. The MPU and privileged operating modes keep the kernel safe from runaway application code.



## EASY TO USE

- The seamless integration between AVR32 microcontrollers, development tools, source code libraries and reference designs enables the user to focus only on application development. Backed up by Atmel's excellent design support and a large and active developer community, the AVR32 will cut development cycles and reduce time to market.



## HIGHER DATA THROUGHPUT

With parallel buses, peripheral DMA controller, memory to memory DMA controller and split memory architecture, the AVR32 UC3 delivers superior bandwidth.

## LOW POWER CONSUMPTION

The AVR32 UC3 includes a state of the art low power architecture. It consumes less than 0.8 mW/MHz in active mode. Designed to deliver more work per MHz than any competitor and with features such as dynamic frequency scaling and peripheral event controller, the AVR32 UC3 is the best 32 bit low power alternative in the market today.

## SHORTEST TIME TO MARKET

The AVR32 UC3 Software Framework offers a unique collection of application software, drivers and libraries. Combined with high-quality, low-cost development tools and a skilled world wide support staff we are proud to ensure the shortest time to market.

## System Performance

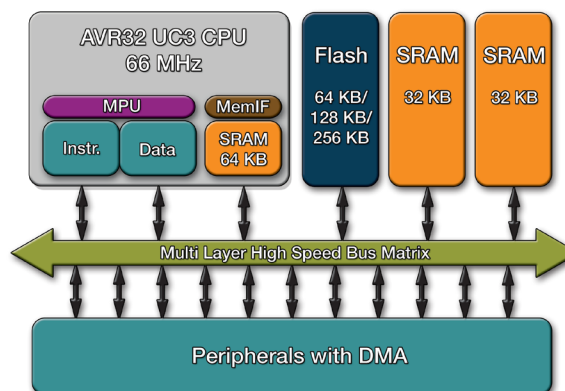
For embedded systems, system performance is much more than a good MIPS number. It is important to have powerful, fast peripherals and an energy-efficient memory system that allows the application to run effortlessly with minimal power consumption.

### Single Cycle SRAM

Fast SRAM access is critical to achieving the necessary computing performance. The UC3 CPU has a single-cycle access to the SRAM embedded in the CPU itself.

### Split Memory Architecture with DMA

High performance peripheral modules require a true memory DMA controller. In addition, the memory is partitioned such that one memory block resides inside the CPU to support single cycle memory access during program execution. To maximize the bandwidth, two more SRAMs are placed on two different layers on the multi-layered high-speed bus and can act as data buffers for high-speed peripherals like the USB. The SRAMs are coupled to the memory DMA controller such that data can be efficiently moved without loading the CPU.

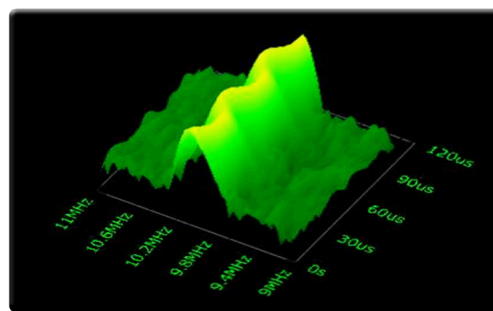


### Bus Matrix

To ensure sufficient data bandwidth, the AVR32 architects have designed a set of parallel buses where each bus master has a dedicated bus for all the slaves. This gives the AVR32 a tremendous data bandwidth and removes the bottleneck encountered in traditional 32-bit microcontrollers.

### Unrivalled DSP Performance

By including powerful instructions for single cycle multiply accumulate and fractional multiply for various number formats, the AVR32 UC3 delivers unrivalled DSP performance compared to legacy architectures. In the AVR32 Software Framework more than 70 DSP functions have been assembly optimized utilizing these instructions. DSP has never been easier.



### Code Density and Efficiency

The AVR32 architecture was designed in close cooperation with compiler experts. This ensures that the AVR32 architecture excels when compiling high-level programming languages like C and C++. Compact and extended instructions are chosen by the compiler without any performance penalty introduced by legacy architectures. A compact code is important, not only because it resolves in a smaller memory footprint, but also because a dense instruction can easily be optimized for both speed and size.



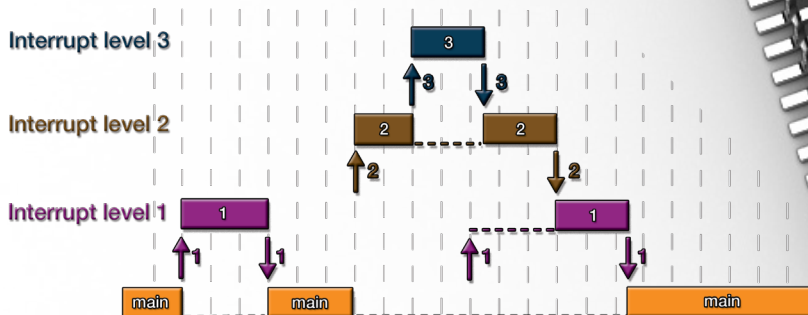
## Peripheral DMA Controller

The Atmel Peripheral DMA controller sets a new standard for data transfer efficiency. If the Peripheral DMA controller is not enabled, the maximum usable transfer rate on the SPI module would be approximately 1 MBit/s, occupying the CPU with more than 50% load just moving data around. With the Peripheral DMA controller this bottleneck is removed and the AVR32 UC3 microcontroller can achieve a transfer rate of 33 MBit/s on SPI and USART with only a 15% load on the CPU. The UC3 can even toggle the I/O pins at 33 MHz.

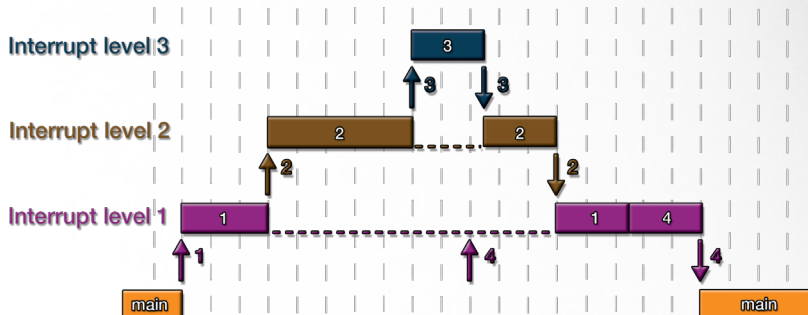
CPU load at various communication speeds		
Bit rate	Peripheral DMA Enabled	Peripheral DMA Disabled
0 Kbit/s	0 %	0 %
400 Kbit/s	0.4 %	17.7 %
1.2 Mbit/s	1.2 %	52.4 %
2 Mbit/s	2.2 %	89.9 %
4 Mbit/s	4.4 %	N/A
33 Mbit/s	14.4 %	N/A

## Interrupt Controller

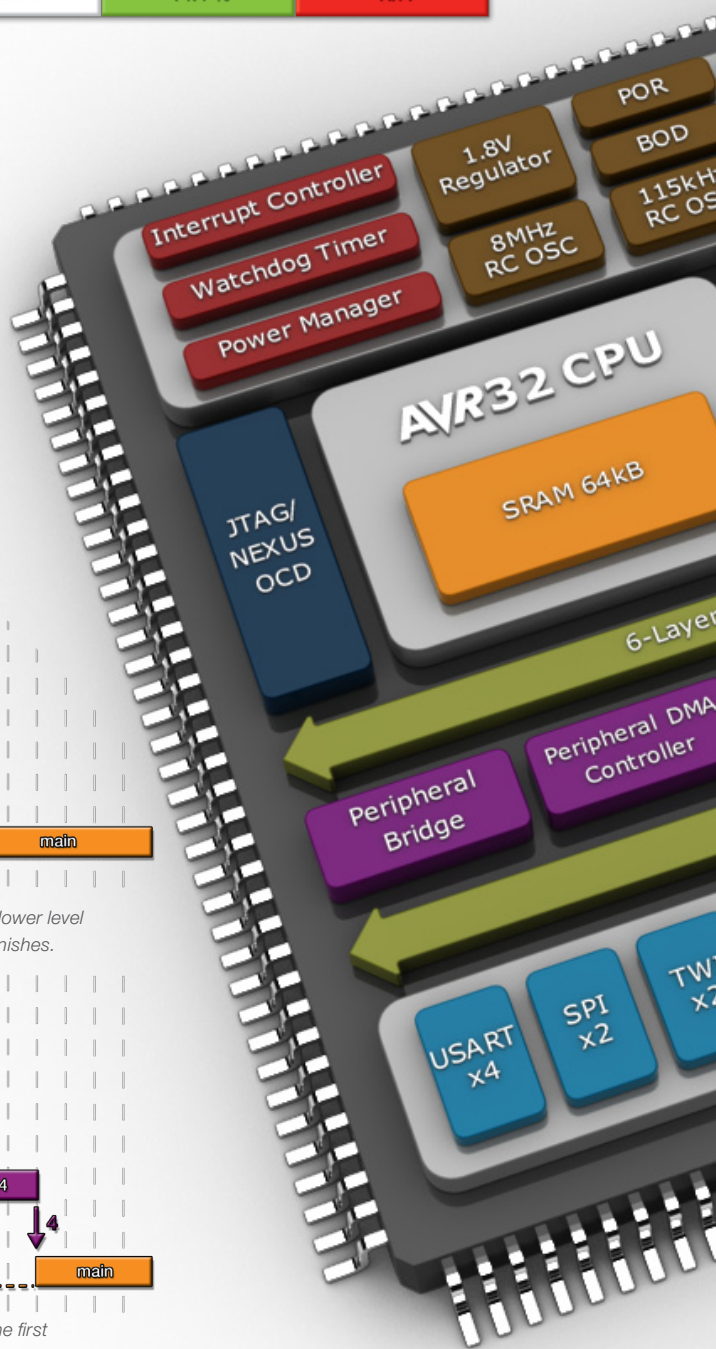
The AVR32 UC3 CPU includes a multi-level interrupt controller. Four priority levels are supported where higher level interrupts are prioritized and executed before low level interrupts. All peripherals can be assigned any interrupt level and the interrupt vector addresses can be changed without stopping the CPU. Interrupt latencies are very fast, typically 11 clock cycles including saving the register file to the stack.



A higher level interrupt will halt execution of a lower level interrupt routine. The lower level interrupt routine will continue and finish after the higher level interrupt routine finishes.

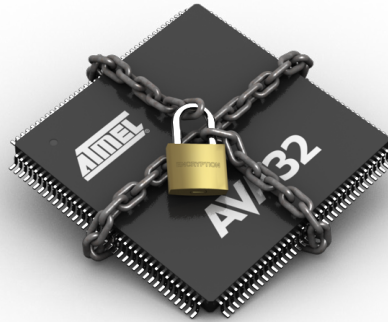


A second interrupt at an interrupt level already being serviced, will pend until the first interrupt routine finishes.



## Security

AVR32UC3L provides mechanisms to protect the system from hacker modification, flash software theft and runaway code.



### Secure CPU State

CPU resources and sections of code/data memory can be reserved for proprietary software IP or critical sections of code/data. A special API is used to access these resources from the rest of the code. Attempts to access these resources by circumventing this API (either by hacking or runaway code) will be aborted and result in an exception.

### Memory Protection Unit (MPU)

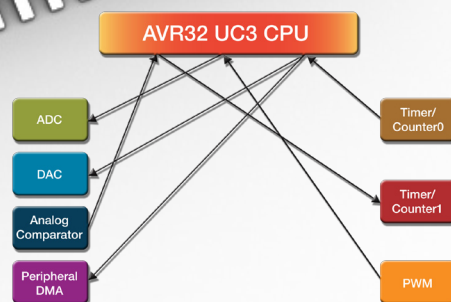
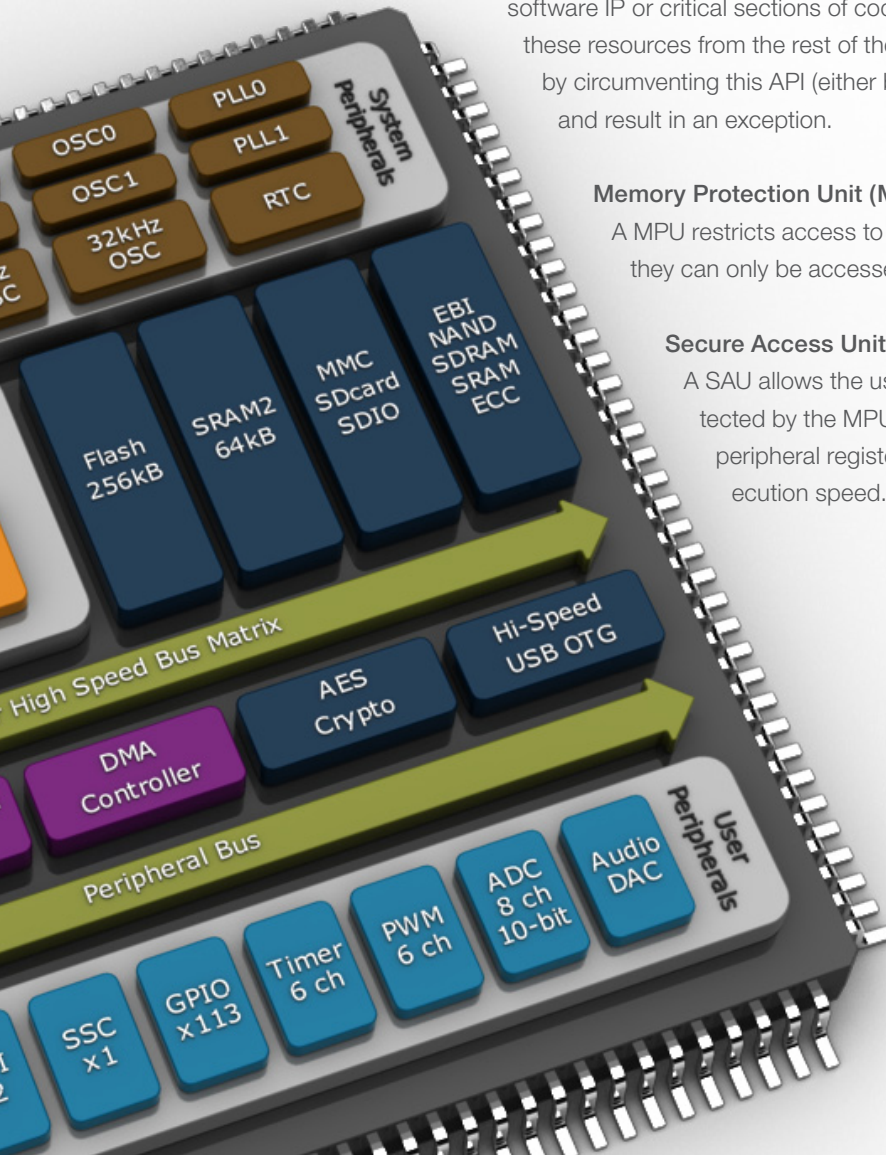
A MPU restricts access to selected peripherals and memory regions so they can only be accessed in a controllable way.

### Secure Access Unit (SAU)

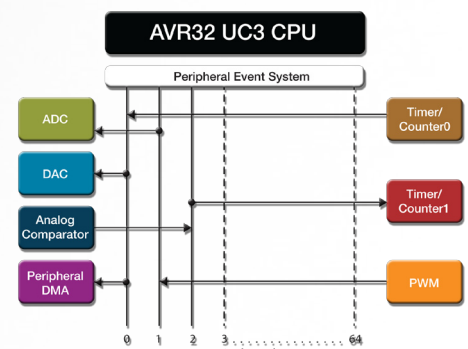
A SAU allows the user to set-up tunnels through regions protected by the MPU, allowing unrestricted access to specified peripheral registers, reducing code size, and increasing execution speed.

## Peripheral Event System

By removing interrupt-driven data transfer and replacing it with an event-triggered data transfer, the innovative Peripheral Event System in AVR32 UC3 represents a paradigm shift. The Peripheral Event System allows the AVR32 UC3 to send signals (events) directly to other peripherals without involving the CPU. This ensures short and predictable response time, and at the same time it offloads the CPU and reduces power consumption.



Without Peripheral Event System all Peripheral Requests need to be handled by the CPU.



With Peripheral Event System peripherals can send signals (events) to other peripherals.

## picoPower Technology

### Reducing Power Consumption while Maintaining Performance

#### True 1.6V Operation

The UC3L family offers true 1.6V operation. All functions — including ADC, DAC, onboard Flash and SRAM — are capable of operating down to 1.62V.

#### Minimized Leakage Current

The AVR32 UC3L leakage current is only 100 nA retaining special purpose registers. The leakage current with a real-time clock running is less than 1.5  $\mu$ A. The real-time clock includes a calendar mode, ensuring that clock cycles are not wasted on calculating date and time.

#### Ultra Low Power 32 KHz Crystal Oscillator

AVR32 UC3L Real Time Clock consumes less than 1.5  $\mu$ A while running from a 32.768 kHz crystal oscillator.

#### Multiple Clock Domains

The main databus and two peripheral data buses can all be set to individual clock frequencies to ensure that no unnecessary power is consumed. The UC3 microcontrollers also feature two crystal oscillators and dual PLLs and DFLLs to simplify the task of selecting a suitable crystal frequency for peripherals such as USB, UART and audio codec.

#### Dynamic Frequency Scaling

Dynamic Frequency Scaling (DFS) reduces power consumption when maximum speed is not required throughout the execution of an application. DFS makes it possible to adapt the clock frequency on-the-fly to an application without halting program execution.

#### Individual Peripheral Clock Control

It is used to turn the clocks on or off dynamically for peripheral units not in use.

#### High Speed I/O Interfaces

AVR32 UC3 comes with a variety of interfaces that combined with the DMA and Peripheral Event Control creates a fast and powerful communication platform.

##### USART

- Asynchronous and synchronous operation
- SPI Mode
- LIN Mode
- Supports IrDA
- Up to 33 Mbps communication
- Peripheral DMA

##### TWI

- I<sup>2</sup>C and SMBus™ compliant
- Full 100 kHz and 400 kHz support
- Master and Slave operation
- Peripheral DMA

##### Up to 36 PWM channels

- 8-bit resolution
- Up to 150 MHz base clock
- Peripheral Event System

##### Ethernet

- Up to 100 Mbps communication
- Peripheral DMA

##### USB On-the-Go

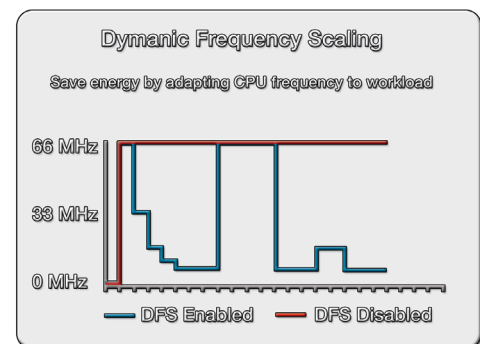
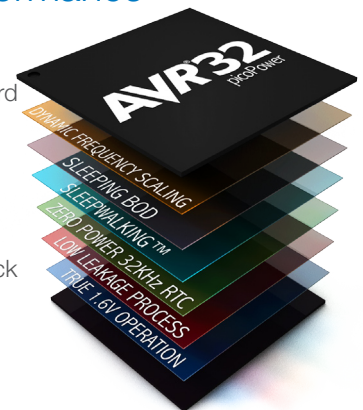
- Host mode
- Up to 480 Mbps communication in Hi-Speed mode
- Peripheral DMA

##### SPI

- Supports up to 15 external devices
- Up to 33 Mbps communication
- Peripheral DMA

##### Synchronous Serial Controller (SSC)

- Full duplex 24-bit I<sup>2</sup>S
- Up to 33 Mbps communication
- Peripheral DMA



## UC3A0/1 Series — for Ethernet and USB OTG Applications

The AT32UC3A Series flash microcontrollers are designed for high data throughput, low power consumption, and outstanding computing performance. The series features high connectivity with USB OTG, Ethernet MAC, and SDRAM interfaces. These features combined with a fast flash and large internal SRAM make it ideally suited for data-intensive applications.

AVR32 UC3A is particularly well suited for applications requiring Ethernet or USB connectivity and high computing performance. The product is used in a range of applications, including audio decode like MP3, biometric applications, bridging, industrial control, and embedded Web servers.

### AVR32 UC3A0/1 Key Features

- 128 - 512 KB Flash
- 32 - 64 KB SRAM
- SRAM / SDRAM controller
- Peripheral DMA controller
- Full Speed USB Device + OTG
- Ethernet MAC
- 4 USARTs
- 2 SPI
- 1 I<sup>2</sup>S 24-bit input
- 1 I<sup>2</sup>S 24-bit output
- Multiple timers and PWM
- 16-bit Stereo bit stream DAC
- 5V tolerant I/O
- 100- and 144-pin package options
- QFP and BGA packages
- Qualified for Automotive

## UC3A3 Series — for Hi-Speed USB Applications

### AVR32 UC3A3 Key Features

- 64 - 256 KB Flash
- 128 KB SRAM (64 KB + 2x32 KB)
- SRAM/ SDRAM controller
- MLC NAND Flash controller
- AES crypto engine
- Peripheral DMA controller
- Memory to Memory DMA
- High Speed USB Device + OTG
- SD/ MMC/ SDIO card controller
- 4 USARTs
- 2 SPI
- 1 I<sup>2</sup>S 24-bit input
- 1 I<sup>2</sup>S 24-bit output
- 16-bit Stereo bit stream DAC
- 144-pin package
- QFP and BGA packages

The AT32UC3A3 flash microcontrollers are designed for exceptionally high data throughput with Hi-Speed USB OTG, SD/ SDIO card, Multi-Level-Cell (MLC) NAND flash with ECC and SDRAM interfaces. Designed with the multi-layered AVR32 databus, 128 KB on-chip SRAM with triple high speed interfaces, and multi-channel peripheral and memory to memory DMA controller, the AT32UC3A3 offers outstanding data throughput. The device also features a Hi-Fi stereo Audio DAC, and a full duplex multi-channel I<sup>2</sup>S audio interface.

The AT32UC3A3 series is available with an AES crypto module, capable of 128 to 256-bit AES encryption at speeds of up

to 22.8 MBytes/s. Note that export restrictions apply to this device variant.

## UC3B Series — for Battery/USB-Powered Applications

The AVR32 UC3B is ideally suited for applications requiring a high-performance Flash MCU where space and power consumption are concerns. The AVR32 UC3B Series delivers 72 DMIPS at 60 MHz and only consumes 23 mA at 3.3V.

The integrated full-speed USB 2.0 interface with On-The-Go capabilities provides an easy way to interface with off-the-shelf USB devices or with other embedded applications already designed to offer USB.

With an interface to real-time sensors/actuators and to open up applications to USB device and host capabilities, the advanced DSP capabilities and the USB interfaces also make the UC3B series ideal as an MCU host companion to extend existing systems.

### AVR32 UC3B Key Features

- 64 - 512 KB Flash
- 16 - 96 KB SRAM
- Peripheral DMA controller
- Full Speed USB Device + OTG
- 3 USARTs
- 2 SPI
- 1 I<sup>2</sup>S 24-bit input
- 1 I<sup>2</sup>S 24-bit output
- Multiple timers and PWM
- 5V tolerant I/O
- 48- and 64-pin package options
- QFP and QFN packages

## UC3C Series — for Industrial Control Applications

AT32UC3C flash microcontrollers are designed for industrial and automotive control applications, including high-speed communication and motor control. The devices feature single or dual CAN interfaces, a full speed USB with OTG, NAND flash and SDRAM interface, PWM with dead-time insertion, two 1.5 MSPS 12-bit ADC with 16 channels and dual sample-and-hold circuitry for synchronized sampling of 2 signals, two 1.5 12-bit analog DAC with dual outputs. Designed with the multi-layered AVR32 databus, 68 KB on-chip SRAM with triple high-speed interfaces, and multi-channel Peripheral and memory to memory DMA controller, the AT32UC3C offers outstanding data throughput.

The AT32UC3C Peripheral Event System provides a connection between on-chip peripherals to off-load the CPU, reduces power consumption and provides a deterministic response to external and internal events.

### AVR32 UC3C Key Features

- 64 – 512 KB Flash
- 68 KB SRAM (2 x 32 KB + 4 KB)
- SRAM / SDRAM controller
- NAND flash controller
- Peripheral DMA controller
- Memory to Memory DMA
- Peripheral Event System
- Single / Dual CAN interface
- Full speed USB device + OTG
- 16 ch 12-bit ADC, 1.5 MSPS dual
- 2 ch 12-bit DAC, 1.5 MSPS
- PWM with dead-time insertion
- 4 USART
- 2 SPI
- 144-, 100- and 64-pin packages
- QFP, QFN and BGA packages

## UC3D Series — for Cost-Sensitive Applications

### AVR32 UC3D Key Features

- 64 - 256 KB Flash
- 8 - 16 KB SRAM
- Peripheral DMA controller
- Full Speed USB Device
- 2 USARTs
- 1 SPI
- Multiple timers and PWM
- 48-pin package
- QFP and QFN packages

The UC3D series is a cost reduced option, ideal for the most cost-sensitive embedded applications that require USB device connectivity. Designed to be 100% pin and functionally compatible with the UC3B series, the UC3D offers a reduced maximum speed, a USB device interface without OTG function, and I/O pads limited to 3.6V maximum voltage.

## UC3L Series — for Battery-Powered Applications

For battery-operated and power-constrained applications, the UC3L is the perfect choice. With a 12-bit ADC, PWM on all pins, 12 DMA channels along with a number of options of serial peripherals, the UC3L is bridging the gap between 8-bit and 32-bit microcontrollers.

With a rich set of peripherals, the DMA, and the award-winning AVR32 UC3 core, the UC3L is an ideal choice in many applications like power-constrained systems, board controllers, and gateways.

With the 12-bit ADC and the 8 analog comparators, applications that require excellent analog capabilities and analysis, the UC3L is an outstanding microcontroller solution.

### AVR32 UC3L Key Features

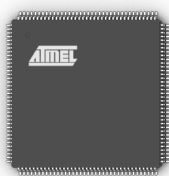
- 16 - 64 KB Flash
- 8 - 16 KB SRAM
- Peripheral DMA controller
- Peripheral Event System
- 4 USARTs
- 1 SPI
- 2 Two-wire Interfaces
- 6 channels 12-bit ADC
- 8 Analog Comparators
- 36 PWM channels
- 48-pin package
- QFP and QFN packages

## Product Selector Guide

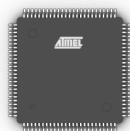
Products	Flash (KBytes)	SRAM (Bytes)	SD/MMC	Ethernet MAC	USB Hi-Speed	USB Full Speed	USB Host/OTG	CAN	USART	SPI	SSC (I <sup>2</sup> S audio)	TWI (I <sup>2</sup> C)	I/O	16-bit Timer/Counters	PWM (Channels)	RTC/ 32 KHz oscillator	Crystal oscillator	Memory Protection Unit	10-bit A/D (Channels)	12-bit A/D (Channels)	Touch Screen ADC	DAC	Analog Comparator	Crypto (AES)	VCC (V)	Clock Speed (MHz)	Package (b)
AT32UC3A0128	128	32K		1		Y	Y		4	2	1	Y	109	3	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A0256	256	64K		1		Y	Y		4	2	1	Y	109	3	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A0512	512	64K		1		Y	Y		4	2	1	Y	109	3	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A1128	128	32K		1		Y	Y		4	2	1	Y	69	3	13	Y	2	Y	8					3.0 - 3.6	66	TQFP100	
AT32UC3A1256	256	64K		1		Y	Y		4	2	1	Y	69	3	13	Y	2	Y	8					3.0 - 3.6	66	TQFP100	
AT32UC3A1512	512	64K		1		Y	Y		4	2	1	Y	69	3	13	Y	2	Y	8					3.0 - 3.6	66	TQFP100	
AT32UC3A364	64	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A3128	128	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A3256	256	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8					3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A364S	64	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8				Y	3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A3128S	128	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8				Y	3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3A3256S	256	128K	Y		Y	Y	Y		4	2	1	Y	110	6	13	Y	2	Y	8				Y	3.0 - 3.6	66	LQFP144, TFBGA144	
AT32UC3B064	64	16K				Y	Y		3	1	1	Y	44	3	13	Y	2	Y	8					3.0 - 3.6	60	TQFP64, QFN64	
AT32UC3B0128	128	32K				Y	Y		3	1	1	Y	44	3	13	Y	2	Y	8					3.0 - 3.6	60	TQFP64, QFN64	
AT32UC3B0256	256	32K				Y	Y		3	1	1	Y	44	3	13	Y	2	Y	8					3.0 - 3.6	60	TQFP64, QFN64	
AT32UC3B0512	512	96K				Y	Y		3	1	1	Y	44	3	13	Y	2	Y	8					3.0 - 3.6	60	TQFP64, QFN64	
AT32UC3B164	64	16K				Y			2	1		Y	28	3	13	Y	1	Y	6					3.0 - 3.6	60	TQFP48, QFN48	
AT32UC3B1128	128	32K				Y			2	1		Y	28	3	13	Y	1	Y	6					3.0 - 3.6	60	TQFP48, QFN48	
AT32UC3B1256	256	32K				Y			2	1		Y	28	3	13	Y	1	Y	6					3.0 - 3.6	60	TQFP48, QFN48	
AT32UC3B1512	512	96K				Y			2	1		Y	28	3	13	Y	1	Y	6					3.0 - 3.6	60	TQFP48, QFN48	
AT32UC3C064	64	16K				Y	Y	2	4	2	1	2	125	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	LQFP144	
AT32UC3C0128	128	32K				Y	Y	2	4	2	1	2	125	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	LQFP144	
AT32UC3C0256	256	64K				Y	Y	2	4	2	1	2	125	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	LQFP144	
AT32UC3C0512	512	64K				Y	Y	2	4	2	1	2	125	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	LQFP144	
AT32UC3C164	64	16K				Y	Y	2	4	2	1	2	83	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	TQFP100	
AT32UC3C1128	128	32K				Y	Y	2	4	2	1	2	83	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	TQFP100	
AT32UC3C1256	256	64K				Y	Y	2	4	2	1	2	83	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	TQFP100	
AT32UC3C1512	512	64K				Y	Y	2	4	2	1	2	83	6	20	Y	2	Y	16	16		2	4	3.0 - 5.5 <sup>(c)</sup>	66	TQFP100	
AT32UC3C264	64	16K				Y	Y	2	3	1	1	2	47	3	20	Y	2	Y	11	11		1	2	3.0 - 5.5 <sup>(c)</sup>	66	TQFP64	
AT32UC3C2128	128	32K				Y	Y	2	3	1	1	2	47	3	20	Y	2	Y	11	11		1	2	3.0 - 5.5 <sup>(c)</sup>	66	TQFP64	
AT32UC3C2256	256	64K				Y	Y	2	3	1	1	2	47	3	20	Y	2	Y	11	11		1	2	3.0 - 5.5 <sup>(c)</sup>	66	TQFP64	
AT32UC3C2512	512	64K				Y	Y	2	3	1	1	2	47	3	20	Y	2	Y	11	11		1	2	3.0 - 5.5 <sup>(c)</sup>	66	TQFP64	
AT32UC3D164	64	8K				Y			2	1		Y	28	3	13	Y	1	Y	6					2.7 - 3.3	40	TQFP48, QFN48	
AT32UC3D1128	128	16K				Y			2	1		Y	28	3	13	Y	1	Y	6					2.7 - 3.3	40	TQFP48, QFN48	
AT32UC3D1256	256	16K				Y			2	1		Y	28	3	13	Y	1	Y	6					2.7 - 3.3	40	TQFP48, QFN48	
AT32UC3L016	16	8K							4	1		Y	36	6	36	Y	1	Y	6	6	Y		8	1.62 - 3.6	50	TQFP48, QFN48	
AT32UC3L032	32	16K							4	1		Y	36	6	36	Y	1	Y	6	6	Y		8	1.62 - 3.6	50	TQFP48, QFN48	
AT32UC3L064	64	16K							4	1		Y	36	6	36	Y	1	Y	6	6	Y		8	1.62 - 3.6	50	TQFP48, QFN48	

a) P: Product in Full Production, I: Device under Introduction, F: Future device.  
 b) Pb-free packaging complies to the European Directive for Restriction of Hazardous Substances (RoHS directive). Also Halide free and fully Green.  
 c) Voltage supply: 3.0 - 3.6V or 4.5 - 5.5V.

## Packaging Options



**LQFP-144**  
 20 x 20 mm  
 0.5 mm pitch



**TQFP-100**  
 14 x 14 mm  
 0.5 mm pitch



**TQFP-64**  
 10 x 10 mm  
 0.5 mm pitch



**TQFP-48**  
 7 x 7 mm  
 0.5 mm pitch



**QFN-64**  
 9 x 9 mm  
 0.5 mm pitch



**QFN-48**  
 7 x 7 mm  
 0.5 mm pitch

## Development Tools

AVR32 UC3 microcontrollers benefit from the well-known AVR tools and software chain, which is renowned for its quality and seamless integration of devices, hardware and software tools, and documentation. Embedded developers will find it easy to succeed with the AVR32.

### Software Tools

#### Free Software Development Tools




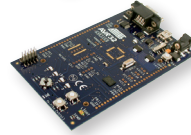



- AVR32 GNU toolchain (gcc, gdb, etc.)
- AVR32 Studio, a multiplatform integrated development environment (IDE)
- AVR32 Software Framework

#### Commercial Software Development Tools

- Embedded Workbench from IAR™ - [www.iar.com](http://www.iar.com)
- ThreadX® from Express Logic - [www.rtos.com](http://www.rtos.com)
- µC/OS-II from Micrium - [www.micrium.com](http://www.micrium.com)
- EmbOS from Segger - [www.segger.com](http://www.segger.com)

The AVR32 third party program is continuously expanding. Please visit [www.atmel.com/avr32](http://www.atmel.com/avr32) for the up-to-date information.

### Hardware Tools

Kit P/N	Supported parts	Description	
<b>AVR ONE!</b> Debugger	All AVR32 MCUs	<ul style="list-style-type: none"> <li>• Nexus and JTAG Interface</li> <li>• Non-intrusive Real-Time Trace</li> <li>• Run-Time Control (Run, Stop, Single-step, Reset)</li> <li>• Program Flash and Fuses</li> </ul>	
<b>JTAGICE mkII</b> Debugger	All AVR32 MCUs	<ul style="list-style-type: none"> <li>• JTAG Interface</li> <li>• Run-Time Control (Run, Stop, Single-step, Reset)</li> <li>• Program Flash and Fuses</li> </ul>	
<b>ATEVK1100</b> Evaluation kit	AT32UC3A series	<ul style="list-style-type: none"> <li>• 10/100 Ethernet and USB OTG interface</li> <li>• SPI, TWI and USARTs</li> <li>• Temperature and light sensors</li> <li>• 20x4 character LCD</li> <li>• MMC/SD card &amp; expansion connector</li> </ul>	
<b>ATEVK1101</b> Evaluation kit	AT32UC3B series	<ul style="list-style-type: none"> <li>• USB OTG interface</li> <li>• SPI, TWI and USARTs</li> <li>• 3-axis accelerometer, temperature and light sensors</li> <li>• MMC/SD card &amp; expansion connector</li> </ul>	
<b>ATEVK1103</b> Evaluation kit	AT32UC3C series	<ul style="list-style-type: none"> <li>• Full Speed USB OTG interface</li> <li>• 320 x 240 QVGA TFT LCD</li> <li>• Dual CAN, LIN, SPI, TWI and USARTs</li> <li>• Capacitive Touch interface</li> <li>• Motor Control Interface</li> </ul>	Will arrive in 2009
<b>ATEVK1104</b> Evaluation kit	AT32UC3A3 series	<ul style="list-style-type: none"> <li>• Hi-Speed USB OTG interface</li> <li>• 320 x 240 QVGA TFT LCD</li> <li>• Two MMC/ SD card connectors</li> <li>• SPI, TWI and USARTs</li> <li>• Capacitive Touch interface</li> </ul>	
<b>ATEVK1105</b> Evaluation kit	AT32UC3A series	<ul style="list-style-type: none"> <li>• 10/100 Ethernet and USB OTG interface</li> <li>• SPI, TWI and USARTs</li> <li>• 320 x 240 QVGA TFT LCD</li> <li>• Capacitive Touch keyboard</li> <li>• Stereo Audio 3.5mm jack output</li> <li>• MMC/SD card expansion connector</li> </ul>	
<b>AT32UC3L-EK</b> Evaluation kit	AT32UC3L series	<ul style="list-style-type: none"> <li>• AT86RF231 IEEE802.15.4 Transceiver</li> <li>• Capacitive Touch Keyboard</li> </ul>	Will arrive in 2009
<b>ATSTK600</b> Starter kit	All AT32UC3 series	Complete programming and development system supporting all AVR32 UC3 series via socket adaptors	

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### **Literature Requests**

[www.atmel.com/literature](http://www.atmel.com/literature)

### **Website**

[www.atmel.com](http://www.atmel.com)

<http://www.atmel.com/avr32>

Device selection Guides, Datasheets, Application notes, Tools, Software, Consultants

<http://support.atmel.no>

Official Atmel MCU technical support center including FAQ and email notification service

<http://www.avrtv.com>

Official AVR Television videos and podcasts

<http://www.avrfreaks.net>

AVR Experts Discussion Forum, Selection Guides, Third Party Tools Information

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