



Atmel AVR XMEGA Microcontrollers

Real-time Performance, High Integration and Ultra-low Power

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The Atmel® AVR® XMEGA® family of 8/16-bit microcontrollers is designed to extend battery lifetime and reduce a project's bill of materials (BOM). This is achieved by combining a unique set of functions that ensures high throughput and real-time performance with ultra-low power consumption and the highest level of integration.

AVR XMEGA devices range from 44-to 100-pin packages and 16KB to 256KB of Flash memory. They are well suited for consumer and industrial applications, such as industrial control, ZigBee and RF, medical and utility metering, advanced board control, communication gateways, sensor control, white goods, HVAC and battery-powered products.

Atmel picoPower Technology

Atmel® picoPower® technology enables true 1.6V operation. This means that all AVR XMEGA devices can run directly from a $\pm 10\%$ 1.8V power supply or allow deeper battery discharge with all functions still working. AVR XMEGA devices consume only 600nA in sleep mode with RTC running and full data retention. The result is ultra-low sleep current combined with fast wake-up, also for highly integrated microcontrollers. The AVR CPU is the world's most efficient 8-bit CPU and delivers up to 32 MIPS performance in AVR XMEGA devices. Combined with DMA and the innovative Event System, this ensures more efficient and shorter active time, and longer sleep cycles that save power.



Atmel AVR XMEGA Devices

Product	Flash (KB)	Boot Code (KB)	EEPROM (KB)	SRAM (KB)	picoPower	DMA Channels	Event System Channels	Crypto Engine	Touch channels	USB
ATxmega64A1U	64	4	2	4	Yes	4	8	AES/DES	56	FS device
ATxmega128A1U	128	8	2	8	Yes	4	8	AES/DES	56	FS device
ATxmega64A3U	64	4	2	4	Yes	4	8	AES/DES	56	FS device
ATxmega128A3U	128	8	2	8	Yes	4	8	AES/DES	56	FS device
ATxmega192A3U	192	8	2	16	Yes	4	8	AES/DES	56	FS device
ATxmega256A3U	256	8	4	16	Yes	4	8	AES/DES	56	FS device
ATxmega256A3BU	256	8	4	16	Yes	4	8	AES/DES	56	FS device
ATxmega16A4U	16	4	1	2	Yes	4	8	AES/DES	56	FS device
ATxmega32A4U	32	4	1	4	Yes	4	8	AES/DES	56	FS device
ATxmega64A4U	64	4	2	4	Yes	4	8	AES/DES	56	FS device
ATxmega128A4U	128	8	2	8	Yes	4	8	AES/DES	56	FS device
ATxmega64B1	64	4	2	4	Yes	2	4	AES/DES	16	FS device
ATxmega128B1	128	8	2	8	Yes	2	4	AES/DES	16	FS device
ATxmega64B3	64	4	2	4	Yes	2	4	AES/DES	16	FS device
ATxmega128B3	128	8	2	8	Yes	2	4	AES/DES	16	FS device
ATxmega64C3	64	8	2	4	Yes	--	4	--	56	FS device
ATxmega128C3	128	8	2	16	Yes	--	4	--	56	FS device
ATxmega192C3	192	8	2	16	Yes	--	4	--	56	FS device
ATxmega256C3	256	8	4	16	Yes	--	4	--	56	FS device
ATxmega384C3	384	8	4	32	Yes	2	4	AES	56	FS device
ATxmega16C4	16	4	1	2	Yes	--	4	--	16	FS device
ATxmega32C4	32	4	1	4	Yes	--	4	--	16	FS device
ATxmega64D3	64	4	2	4	Yes	--	4	--	56	--
ATxmega128D3	128	8	2	8	Yes	--	4	--	16	--
ATxmega192D3	192	8	2	16	Yes	--	4	--	16	--
ATxmega256D3	256	8	4	16	Yes	--	4	--	16	--
ATxmega384D3	384	8	4	32	Yes	2	4	--	56	--
ATxmega16D4	16	4	1	2	Yes	--	4	--	56	--
ATxmega32D4	32	4	1	4	Yes	--	4	--	56	--
ATxmega64D4	64	4	2	4	Yes	--	4	--	16	--
ATxmega128D4	128	8	2	8	Yes	--	4	--	16	--
ATxmega8E5	8	2	0.5	1	Yes	4	8	--	56	--
ATxmega16E5	16	4	1	2	Yes	4	8	--	56	--
ATxmega32E5	32	4	1	4	Yes	4	8	--	56	--

(a) Pb-free packaging complies to the European Directive for Restriction of Hazardous Substances (RoHS directive). Also halide free and fully green.
 (b) RTC also include a built in battery backup function
 (c) Has two additional 8-bit Timer/Counters in the XMEGA Custom Logic module.
 (d) DAC is 10-bit 300kSPS.

AVR XMEGA Highlights

High-precision Analog — 12-bit ADCs with gain stage and combined throughput of 4 MSPS. Fast 12-bit DAC with high drive strength, as well as other functions that reduce the need for external components.

Real-time Performance — The event system facilitates inter-peripheral signaling with 100% predictable response time. To offload the CPU, all peripherals can use DMA for data transfer.

Atmel picoPower Technology — True 1.6 volt operation, and 600 nA RTC operation with full SRAM retention for the fastest wake-up time.

High Integration: — AVR XMEGA devices integrate AES and DES cryptographic modules, up to 32 PWM outputs, 8 USART,

4 TWI (I²C) and 4 SPI interfaces, CRC generator module, and more.

Atmel QTouch® Sensing — QTouch Library support means that you can easily realize robust capacitive touch sensing interfaces for button, sliders and wheels.

USB Connectivity — Full-speed operation without the need for an external crystal reduces the bill of materials. 31 endpoints, and the unique multi-packet function maximize data transfer rates while minimizing CPU load.

Ultra-low Power LCD Controller — Supporting up to 160 segments and includes several features to reduce design complexity and power consumption.

SPI	TWI (I ² C)	USART	RTC	16-bit Timers	PWM Channels	12-bit ADC Channels	12-bit DAC Channels	Analog Comparators	LCD Controller	I/O Pins	F _{max} (MHz)	V _{cc} (V)	Green Packages (a)	Temp. Range
4+8 USART master	4	8	16-bit	8	32	16	4	4	--	78	32	1.6 - 3.6	TQFP100, VFBGA100	-40°C to +85°C
4+8 USART master	4	8	16-bit	8	32	16	4	4	--	78	32	1.6 - 3.6	TQFP100, VFBGA100	-40°C to +85°C
3+7 USART master	2	7	16-bit	7	32	16	2	4	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
3+7 USART master	2	7	16-bit	7	32	16	2	4	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
3+7 USART master	2	7	16-bit	7	32	16	2	4	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
3+7 USART master	2	7	16-bit	7	32	16	2	4	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+6 USART master	2	6	32-bit(2)	7	29	16	2	4	--	47	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+5 USART master	2	5	16-bit	5	20	12	2	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+5 USART master	2	5	16-bit	5	20	12	2	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+5 USART master	2	5	16-bit	5	20	12	2	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+5 USART master	2	5	16-bit	5	20	12	2	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
1+2 USART master	1	2	16-bit	3	10	16	--	4	160 Segment	53	32	1.6 - 3.6	TQFP100	-40°C to +85°C
1+2 USART master	1	2	16-bit	3	10	16	--	4	160 Segment	53	32	1.6 - 3.6	TQFP100	-40°C to +85°C
1+1 USART master	1	1	16-bit	2	6	8	--	2	100 Segment	36	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
1+1 USART master	1	1	16-bit	2	6	8	--	2	100 Segment	36	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+3 USART master	2	3	16-bit	5	32	16	--	2	--	50	32	1.6 - 3.6	TQFP64, VQFN64	-40°C to +85°C
2+2 USART master	2	2	16-bit	4	20	12	--	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+2 USART master	2	2	16-bit	4	20	12	--	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+2 USART master	2	2	16-bit	4	20	12	--	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
2+2 USART master	2	2	16-bit	4	20	12	--	2	--	34	32	1.6 - 3.6	TQFP44, VFBGA49, VQFN44	-40°C to +85°C
1+2 USART master	1	2	16-bit	3 (c)	12	16	2 (d)	2	--	26	32	1.6 - 3.6	TQFP32, QFN32	-40°C to +85°C
1+2 USART master	1	2	16-bit	3 (c)	12	16	2 (d)	2	--	26	32	1.6 - 3.6	TQFP32, QFN32	-40°C to +85°C
1+2 USART master	1	2	16-bit	3 (c)	12	16	2 (d)	2	--	26	32	1.6 - 3.6	TQFP32, QFN32	-40°C to +85°C

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One Toolchain Covers Everything

All Atmel AVR microcontrollers are supported by the same seamless development environment and toolchain. Atmel Studio is the integrated development environment that is used to generate all firmware running inside an Atmel AVR and Cortex™-M based microcontroller. It includes all you need to develop firmware for any AVR microcontroller. Atmel Studio is also the front-end software for all Atmel AVR hardware development tools, including starter kits, in-system programmers and debuggers, evaluation kits and reference designs.



For more information, visit <http://www.atmel.com/atmelstudio>

Atmel Software Framework

The Atmel Software Framework is a key component of Atmel Studio. It provides a complete library of peripheral drivers and communication stacks for AVR and Cortex-M based microcontrollers. By being fully integrated in Atmel Studio it is available at your fingertips just like your own written code.

Get Started

For more information, visit www.atmel.com/XMEGA. Here you can access:

- Getting started guides
- Device selection and datasheets
- Atmel Studio and Atmel Software Framework

To get started, simply download and install Atmel Studio. Follow the instruction to build your first AVR XMEGA example application. You can test your application using the simulator, or get hardware such as the XMEGA Xplained evaluation kit: www.atmel.com/Xplained.

Atmel provides all device-specific parts for your application development so you can spend your time and effort on differentiating your application.



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