

# tinyAVR® Microcontrollers

## Summary

tinyAVR microcontrollers are equipped with high-speed integrated analog, hardware-based Core Independent Peripherals (CIPs) and low-power performance for efficient, real-time control and sensor node applications in a small physical footprint to help optimize board layout. This family offers a broad range of memory and pin-and-package configurations, from 2 KB to 32 KB Flash memory and 8- to 24-pin packages. The tinyAVR microcontrollers are well-suited for a wide range of applications including industrial, consumer, appliances, automotive and Internet of Things (IoT) sensor nodes.



## Deterministic Real-Time Control Response

A hardware-based connectivity matrix allows the peripherals to communicate with one another without involving the CPU core. This functionality can be used to save energy, increase determinism in control loops, or both. More importantly, the event system is easily configured with our free software tools, helping decrease system validation time.

## Reduce Cost and PCB footprint

The need for external components is greatly reduced with an accurate and temperature-stable 20 MHz internal RC oscillator, Configurable Custom Logic (CCL) and Core Independent Peripherals. The CCL is a highly configurable on-chip module that can be used for a variety of system tasks, ranging from simple digital signal inversion to complex event sequencing for significant cost savings to embedded designs. Additionally, the small 3 x 3 mm 20-pin QFN package option further reduces PCB footprint, enabling developers to create extremely compact designs.

## Responsive Signal Acquisition

The 10-bit Analog-to-Digital Converter (ADC) with conversion speeds of 115,000 samples per second provides accurate and timely analog signal acquisition. Triggering and notifications can be transmitted to other peripherals without CPU intervention, enabling robust and deterministic response to system events. Furthermore, some family members have two 10-bit ADCs which enables advanced touch sensing and analog signal acquisitions to be performed simultaneously.

## Advanced Touch Sensing

Peripheral Touch Controller (PTC) offers built-in hardware for capacitive touch measurement on sensors that function as buttons, sliders, and wheels. The PTC is designed to perform capacitive touch acquisition on sensors independently from the CPU, resulting in low CPU utilization and reduced power consumption.

## Built-in Safety Features

Add robustness and reliability to an application by utilizing the built-in features, such as the Windowed Watchdog Timer (WDT), the Cyclic Redundancy Check (CRC) feature to scan the Flash memory and fault detection using the Event System, to support safety critical applications.

## Key Attributes

- Internal 20 MHz oscillator
- Up to 32 KB of Flash memory
- Up to 2 10-bit ADCs
- Peripheral Touch Controller (PTC)
- Cyclic Redundancy Check (CRC) scan
- 16-bit real-time clock and periodic interrupt timer
- Configurable Custom Logic (CCL) peripheral
- Up to 6-channel peripheral event system
- Analog comparator with scalable reference input
- Configurable, internally generated reference voltage
- USART/SPI/dual-mode TWI
- 1.8V–5.5V operating voltage range
- $-40^{\circ}$  to  $125^{\circ}\text{C}$  operating temperature range

## Get Started Now

Getting started with AVR® microcontrollers has never been easier! All AVR MCU families are fully supported by our comprehensive development ecosystem, which includes Atmel Studio—our free Integrated Development Environment (IDE) with built-in GCC compiler, and our powerful Atmel START configuration tool.

Significantly reduce your development time with Atmel START—our intuitive, web-based graphical configuration tool for embedded projects. While you navigate through the easy-to-use interface, Atmel START generates factory-validated C-code to help you get your design started correctly. Get started today at [start.atmel.com](http://start.atmel.com).

The ATtiny3217-XPRO Evaluation kit is the ideal platform for rapid prototyping with our tinyAVR MCUs. The USB-powered kit features an on-board programmer/debugger that seamlessly integrates with Atmel Studio, along with touch buttons, LEDs, and extension headers for quick setup. The board also has a MikroBUS™ -compatible socket, allowing you to easily add sensors, actuators, or communications interfaces from Mikroelektronika's extensive library of click boards™. For smaller memory options, we also recommend the ATtiny817-XPRO and ATtiny416-NANO kits.

For more information, visit [www.microchip.com/design-centers/8-bit/avr-mcus/get-started-now](http://www.microchip.com/design-centers/8-bit/avr-mcus/get-started-now)

Part Number	Program Flash (KB)	EEPROM (B)	Data SRAM (KB)	Pins	I/O Pins	10-bit ADC	10-bit ADC (ch)	Analog Comparator	DAC Output	Peripheral Touch Controller (PTC)	16-bit Timers	12-bit Timers	Event System Channels	Window WDT	32.768 kHz crystal Osc.	Configurable Custom Logic	USART/I²C/SPI	Packages
ATTINY3217	32	256	2048	24	22	2	12 + 12	3	1	Y	2	2	6	Y	Y	1	1/1/1	VQFN
ATTINY3216	32	256	2048	20	18	2	12 + 8	3	1	Y	2	2	6	Y	Y	1	1/1/1	SOIC
ATTINY1617	16	256	2048	24	22	2	12 + 12	3	1	Y	2	2	6	Y	Y	1	1/1/1	VQFN
ATTINY1616	16	256	2048	20	18	2	12 + 8	3	1	Y	2	2	6	Y	Y	1	1/1/1	VQFN, SOIC
ATTINY1614	16	256	2048	14	12	2	10 + 4	3	1	Y	2	2	6	Y	Y	1	1/1/1	SOIC
ATTINY817	8	128	512	24	22	1	12	1	1	Y	2	1	6	Y	Y	1	1/1/1	VQFN
ATTINY816	8	128	512	20	18	1	12	1	1	Y	2	1	6	Y	Y	1	1/1/1	VQFN, SOIC
ATTINY814	8	128	512	14	12	1	10	1	1	Y	2	1	6	Y	Y	1	1/1/1	SOIC
ATTINY417	4	128	256	24	22	1	12	1	1	—	2	1	6	Y	Y	1	1/1/1	VQFN
ATTINY416	4	128	256	20	18	1	12	1	1	—	2	1	6	Y	Y	1	1/1/1	VQFN, SOIC
ATTINY414	4	128	256	14	12	1	10	1	1	—	2	1	6	Y	Y	1	1/1/1	SOIC
ATTINY412	4	128	256	8	6	1	6	1	1	—	2	1	6	Y	—	1	1/1/1	SOIC
ATTINY214	2	64	128	14	12	1	10	1	1	—	2	1	6	Y	Y	1	1/1/1	SOIC
ATTINY212	2	64	128	8	6	1	6	1	1	—	2	1	6	Y	—	1	1/1/1	SOIC
ATTINY1607	16	256	1,024	24	22	1	12	1	—	—	2	1	3	Y	—	1	1/1/1	VQFN
ATTINY1606	16	256	1,024	20	18	1	12	1	—	—	2	1	3	Y	—	1	1/1/1	VQFN, SOIC
ATTINY1604	16	256	1,024	14	12	1	10	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC
ATTINY807	8	128	512	24	22	1	12	1	—	—	2	1	3	Y	—	1	1/1/1	VQFN
ATTINY806	8	128	512	20	18	1	12	1	—	—	2	1	3	Y	—	1	1/1/1	VQFN, SOIC
ATTINY804	8	128	512	14	12	1	10	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC
ATTINY406	4	128	256	20	18	1	12	1	—	—	2	1	3	Y	—	1	1/1/1	VQFN, SOIC
ATTINY404	4	128	256	14	12	1	10	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC
ATTINY402	4	128	256	8	6	1	6	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC
ATTINY204	2	64	128	14	12	1	10	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC
ATTINY202	2	64	128	8	6	1	6	1	—	—	2	1	3	Y	—	1	1/1/1	SOIC

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