AVR® Microcontrollers: Unveiling the Next Generation of ATtiny and ATmega Devices

Differences Between ATtiny, ATmega, and the New AVR XX Microcontrollers for Your Design

Navigating the landscape of microcontrollers (MCUs) can be challenging, especially with the variety of options available. ATtiny and ATmega MCUs have long been trusted choices for various applications, including automotive, industrial, home appliances, medical and consumer products. However, as technology advances, so do the capabilities of these MCU families. This article explores the evolution of MCUs under the new AVR family naming convention and highlights the upgrades they bring.

The Evolution of AVR Microcontrollers

The recent rebranding of the ATtiny and ATmega product lines under the unified AVR family name marks a significant advancement. This change not only streamlines the product lines but also expands their peripherals, offering a more comprehensive and versatile portfolio for designers. In 2020, the AVR DA, the first microcontroller under the AVR family name, was released. Since then, Microchip has introduced the AVR DB, AVR DD, AVR DU, AVR EA and AVR EB families of MCUs, each bringing new features while maintaining the robust AVR architecture. This evolution empowers creators to develop compact, user-friendly and complex designs with greater ease.

Optimizing Design with New Features

For those familiar with the ATtiny and ATmega devices, the transition to the new AVR family series is designed to enhance functionality without compromising simplicity. The AVR family introduces Core Independent Peripherals (CIPs) that streamline the design process and optimize the Bill of Materials (BOM) cost and space. Some featured CIPs are listed below.

Capability	Feature	MCU Family
Touch	Peripheral Touch Controller (PTC)	AVR® DA MCU Family
Level Shifting	Multi-Voltage I/O (MVIO)	AVR DD and DB MCU Families
Motor Control	Timer/Counter Type E (TCE) and Timer/Counter Type F (TCF)	AVR EB MCU Family
High-Speed Integrated Analog	A 12-bit differential Analog-to-Digital Converter (ADC) and a	AVR EA MCU Family

	Programmable Gain Amplifier (PGA) with up to 16× gain	
USB 2.0 Functionality	USB Peripherals	AVR DU MCU Family
Better Component Matching and Higher Performance	On-board op amps	AVR DB MCU Family

Enhanced Performance, Flexibility and Safety

Designers familiar with ATtiny and ATmega devices will appreciate the enhanced analog performance and greater design flexibility of the new AVR family series. Advanced analog functionalities, such as a 12-bit ADC, a 10-bit DAC and an Analog Comparator, significantly boost the capabilities of these MCUs. The Event System (EVSYS) and Configurable Custom Logic (CCL) provides designers with more control, making it easier to configure peripherals to meet specific application needs. These improvements make the new AVR families well suited for applications requiring precise analog performance.

Modern embedded projects often demand safety features to enhance application reliability. The new AVR family series includes crucial safety features such as a Windowed Watchdog Timer (WWDT) for system supervision, Cyclic Redundancy Check (CRC) for scanning Flash memory, Voltage Level Monitor (VLM), Brown-Out Detector (BOD) and Power-On Reset (POR). These features are essential for creating robust and reliable applications.

Introducing the AVR DD MCU

The AVR DD MCU is an excellent entry point into the new AVR family, combining the best features of the ATtiny and ATmega devices while introducing innovative peripherals. With its robust AVR architecture, the AVR DD MCU enhances design capabilities with features like Multi-Voltage I/O (MVIO), integrated analog and custom logic CIPs. These advancements simplify the design process, reduce BOM costs and offer greater flexibility in handling different voltage requirements.

On the software side, MPLAB® X Integrated Development Environment (IDE) makes development easier. This expandable, highly configurable software program incorporates powerful tools to help you discover, configure, develop, debug and qualify embedded designs. MPLAB Code Configurator (MCC) Melody offers seamless code generation with an enhanced and flexible architecture for effortless configuration of devices, peripherals and libraries.

Conclusion

AVR MCUs represent a significant step forward in the evolution of MCU technology. By unifying the ATtiny and ATmega product lines under the AVR family umbrella and introducing new features like Multi-Voltage I/O and enhanced analog capabilities, the AVR DD MCU offers designers greater flexibility and functionality. Whether developers are looking to optimize BOM, enhance performance or simplify the design process, the AVR DD MCU is a versatile and powerful option worth exploring. Upgrade to the new AVR MCUs and take your design to the next level.