# AVR® DD MCU Family of Microcontrollers

## Summary

Microchip's AVR® DD family gives you the freedom to innovate your smart sensor fusion functions or IoT end node applications. The family offers large memories in small packages, which make them ideal for cost and space constrained designs.

The AVR DD family also brings Multi-Voltage I/O (MVIO) support, which removes the headache of matching voltages with external sensors or other devices. Real-time control functionality paired with the latest Core Independent Peripherals (CIP) results in a microcontroller that not only excels as a standalone processor but also as a great companion microcontroller in a larger system. Available in 14- to 32-pin packages, with up to 64KB Flash and operating at up 24 MHz across the full supply voltage range of 1.8V to 5.5V, the new AVR DD MCUs are ready to meet the needs of a diverse range of applications.

## Designed for Demanding Analog Applications

The family uses the latest Core Independent Peripherals with low power features and 5V operation for increased noise immunity. The Event System, Configurable Custom Logic (CCL), along with in-telligent analog peripherals, like 12-bit differential ADC, Zero-Cross Detect (ZCD), 10-bit DAC and Multi Voltage I/O make the AVR DD MCU family ideal for analog signal conditioning, interfacing sensors and IoT end nodes.

## Multi Voltage I/O (MVIO)

The MVIO allows seamless bi-directional communication with devices or modules running on a different voltage domain without using external level shifters, saving both cost and board space. The MVIO system is located on PORT C. This means that Port C can be powered by a different voltage than the rest of the device. This VDDIO2 can be both higher or lower than the main $V_{DD}$ and level shifting will be completely transparent for the user.

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## Functional Safety



The AVR DD MCU family is recommended for safety critical applications targeting both industrial and automotive products (IEC 61508 and ISO 26262). Necessary documentation such as FMEDA report and Safety Manual can be provided on request. Safety certified development tools are also available for this product. Please contact your local Microchip sales office or your distributor for more information.

## High Performance Analog

The 12-bit differential Analog-to-Digital Converter (ADC) with conversion speeds of 130 ksps 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.

## Get Started Now
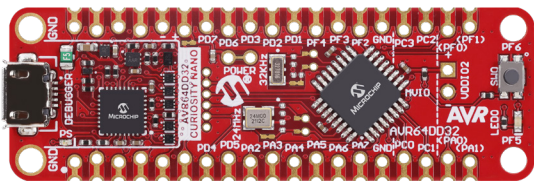


All AVR MCUs are fully supported by our comprehensive development ecosystem, which includes MPLAB X  and Studio—our free IDEs with built-in GCC compiler, and our powerful MPLAB Code Configurator (MCC) and START code configuration tools generating factory-validated C-code to help you get your design started correctly. Get started today at microchip.com/mplab/mplab-code configurator or start.atmel.com. We also offer the MPLAB® XC8 Functional Safety Compiler License, which is a TÜV SÜD certified compiler package that supports 8-bit PIC® and AVR® microcontrollers.

The AVR4DD32 Curiosity Nano Evaluation kit microchip/EV72Y42A is the ideal platform for rapid prototyping with the AVR DD MCUs connection seamlessly to MPLAB X IDE and Studio.

## Key Features

- Internal 24 MHz oscillator
- External high-frequency crystal oscillator (XOSCHF) with Clock Failure Detection (CFD)
- Up to 64 KB of Flash memory
- 12-bit differential ADC with up to 22-channels
- Multi Voltage I/O on Port C (4 lines)
- 10-bit DAC
- Analog Comparator with scalable reference input
- Zero Cross Detectors (ZCD)
- Built in safety functions: POR, BOR, VLM and Cyclic Redun-dancy Check (CRC) scan
- 16-bit Real Time Clock and Periodic Interrupt Timer
- Configurable Custom Logic (CCL) peripheral
- Up to 6-channel Peripheral Event System
- Configurable, internally generated Reference Voltage
- USART / SPI / dual-mode TWI
- Available with up to 26 I/O
- Available in 14, 20. 28 and 32- pin packages
- 1.8V–5.5V operating voltage range
- –40˚ to +125˚C operating temperature range

| Product | Max CPU speed (MHz) | Flash (KB) | EEPROM (B) | SRAM (KB) | Pins | 12-bit differential ADC (channels) | 10-bit DAC (output) | Analog Comparator | MVIO Pins | Zero Cross Detectors | Event System channels | External Interrupts | Window WDT | Configurable Custom Logic/(LUTs) | USART/SPI/I2C | TCA | TCB | TCD | Temp grade options (°C) | Packages |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVR64DD32 | 24 | 64 | 256 | 8 | 27/26 | 23 | 1(1) | 2 | 4 | 1 | 6 | 27 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | VQFN, TQFP |
| AVR64DD28 | 24 | 64 | 256 | 8 | 23/22 | 19 | 1(1) | 2 | 4 | 1 | 6 | 23 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | SPDIP, SOIC, SSOP, VQFN |
| AVR64DD20 | 24 | 64 | 256 | 8 | 17/16 | 13 | 1(1) | 2 | 4 | 1 | 6 | 17 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |
| AVR64DD14 | 24 | 64 | 256 | 8 | 11/10 | 7 | 1(1) | 2 | 4 | 1 | 6 | 11 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |
| AVR32DD32 | 24 | 32 | 256 | 4 | 27/26 | 23 | 1(1) | 2 | 4 | 1 | 6 | 27 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | VQFN, TQFP |
| AVR32DD28 | 24 | 32 | 256 | 4 | 23/22 | 19 | 1(1) | 2 | 4 | 1 | 6 | 23 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | SPDIP, SOIC SSOP, VQFN |
| AVR32DD20 | 24 | 32 | 256 | 4 | 17/16 | 13 | 1(1) | 2 | 4 | 1 | 6 | 17 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |
| AVR32DD14 | 24 | 32 | 256 | 4 | 11/10 | 7 | 1(1) | 2 | 4 | 1 | 6 | 11 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |
| AVR16DD32 | 24 | 16 | 256 | 2 | 27/26 | 23 | 1(1) | 2 | 4 | 1 | 6 | 27 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | VQFN, TQFP |
| AVR16DD28 | 24 | 16 | 256 | 2 | 23/22 | 19 | 1(1) | 2 | 4 | 1 | 6 | 23 | 1 | 1(4) | 1/1/1 | 1 | 3 | 1 | Ind, 85 Ext, 125 | SPDIP, SOIC SSOP, VQFN |
| AVR16DD20 | 24 | 16 | 256 | 2 | 17/16 | 13 | 1(1) | 2 | 4 | 1 | 6 | 17 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |
| AVR16DD14 | 24 | 16 | 256 | 2 | 11/10 | 7 | 1(1) | 2 | 4 | 1 | 6 | 11 | 1 | 1(4) | 1/1/1 | 1 | 2 | 1 | Ind, 85 Ext, 125 | SOIC |

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