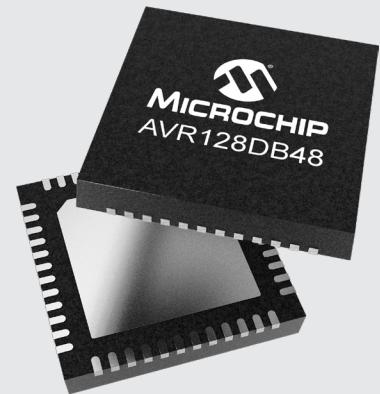


# AVR<sup>®</sup> DB Family of Microcontrollers

## Summary

Microchip's AVR<sup>®</sup> DB family brings unprecedented analog capability and real-time control functionality to the popular and powerful AVR core. The AVR DB combines integrated level shifters and three highly configurable op amps with the latest Core Independent Peripherals (CIP) to create a device that not only excels as a standalone processor, but is also a perfect companion MCU in designs with multiple power domains.

Coming in 28- to 64-pin packages, with up to 128 KB Flash and operating at up to 24 MHz across the full supply voltage range of 1.8V to 5.5V the new AVR DB MCUs are ready to meet the needs of a diverse range of applications.



## Designed for Demanding Analog Applications

Intelligent analog peripherals, like 12-bit differential ADC, op amps, Zero-Cross Detect (ZCD), 10-bit DAC and Multi Voltage I/O make the AVR DB family ideal for analog signal conditioning, interfacing sensors and IoT end nodes. The family uses the latest Core Independent Peripherals with low-power features and 5V operation for increased noise immunity in harsh environments.

## Multi Voltage I/O (MVIO)

The AVR DB includes a unique MVIO option on PORT C. This means that Port C can be interfaced to a different voltage than the rest of the device. This second voltage can be either higher or lower than the main V<sub>DD</sub> and level shifting will be completely transparent for the user. This allows seamless bi-directional communication with devices or modules running on a different voltage domain without using external level shifters, saving cost and board space.

## Operational Amplifiers (OPAMP)

The AVR DB includes 3 highly configurable operational amplifiers that are perfect for analog signal conditioning. Each op amp has its own optional feedback resistor network allowing a wide range of configurations, many without the need for external components. Inverting and non-inverting amplifiers, filters and instrumentation amplifiers can easily be configured without writing code, by using Microchip's graphical code building tools MPLAB<sup>®</sup> Code Configurator (MCC) and Atmel START code builder.

The op amps are also supported by MPLAB Mindi<sup>™</sup> Analog Simulator which allow full analog simulation of the operation and performance of the analog signal conditioning configuration.

## Functional Safety

The AVR-DB 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 ksp/s provides accurate and timely analog signal acquisition. Triggering signals and notifications can be transmitted to other peripherals without CPU intervention, enabling robust and deterministic response to system events.

The 10-bit DAC output can either be available on an external pin or it can be used to generate an adjustable reference voltage for the Analog Comparator (AC). The AVR-DA features up to three ACs, each having a dedicated DAC reference.

## Key Features

- Internal 24 MHz oscillator
- External high-frequency crystal oscillator (XOSC/HF) with clock failure detection (CFD)
- Up to 128 KB of Flash memory
- 12-bit differential ADC with up to 22 channels
- Up to three op amps
- Multi Voltage I/O on Port C (8 lines)
- 10-bit DAC
- Analog Comparator with scalable reference input
- Up to three Zero Cross Detectors
- Built in safety functions: POR, BOR, VLM and Cyclic Redundancy Check (CRC) scan

- 16-bit Real-Time Clock and Periodic Interrupt Timer
- Configurable Custom Logic (CCL) peripheral
- Up to 10-channel Peripheral Event System
- Configurable, internally generated Reference Voltage
- USART/SPI/dual-mode TWI
- Available with up to 54 I/O
- Available in 28-, 32-, 48- and 64-pin packages
- 1.8V to 5.5V operating voltage range
- -40° to +125°C operating temperature range

## Get Started Now

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

The AVR128DB48 Curiosity Nano Evaluation kit [www.microchip.com/EV35L43A](http://www.microchip.com/EV35L43A) is the ideal platform for rapid prototyping with the AVR DB MCUs connection seamlessly to MPLAB X IDE and Studio.

Product	Max CPU speed (MHz)	Flash (KB)	EEPROM (B)	SRAM (KB)	Pins	I/O pins	12-bit differential ADC (channels)	10-bit DAC (output)	Analog Comparator	OPAMPs	MVIO Pins	Zero Cross Detectors	Event System channels	Window WDT	Configurable Custom Logic (LUTs)	USART/SPI/I <sup>2</sup> C	16-bit Timer/Counters	12-bit Timer/Counter	Temperature Grade Options (°C)	Packages
AVR128DB28	24	128	512	16	28	22	1(10)	4(1)	3	2	8	1	8	1	1(4)	3/2/1	4	1	Industrial, 85 Extended, 125	SPDIP SOIC SSOP
AVR128DB32	24	128	512	16	32	26	1(14)	4(1)	3	2	8	1	8	1	1(4)	3/2/2	4	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR128DB48	24	128	512	16	48	40	1(18)	4(1)	3	3	8	2	10	1	1(6)	5/2/2	5	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR128DB64	24	128	512	16	64	54	1(22)	4(1)	3	3	8	3	10	1	1(6)	6/2/2	6	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR64DB28	24	64	512	8	28	22	1(10)	4(1)	3	2	8	1	8	1	1(4)	3/2/1	4	1	Industrial, 85 Extended, 125	SPDIP SOIC SSOP
AVR64DB32	24	64	512	8	32	26	1(14)	4(1)	3	2	8	1	8	1	1(4)	3/2/2	4	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR64DB48	24	64	512	8	48	40	1(18)	4(1)	3	3	8	2	10	1	1(6)	5/2/2	5	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR64DB64	24	64	512	8	64	54	1(22)	4(1)	3	3	8	3	10	1	1(6)	6/2/2	6	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR32DB28	24	32	512	4	28	22	1(10)	4(1)	3	2	8	1	8	1	1(4)	3/2/1	4	1	Industrial, 85 Extended, 125	SPDIP SOIC SSOP
AVR32DB32	24	32	512	4	32	26	1(14)	4(1)	3	2	8	1	8	1	1(4)	3/2/2	4	1	Industrial, 85 Extended, 125	TQFP VQFN
AVR32DB48	24	32	512	4	48	40	1(18)	4(1)	3	3	8	2	10	1	1(6)	5/2/2	5	1	Industrial, 85 Extended, 125	TQFP VQFN

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