# AVR-DA Product Family

High Performance Functional Safety Ready Microcontrollers

Summary

Microchip's AVR-DA family brings easy capacitive touch and real-time control functionality to the low-power performance of the AVR® Microcontrollers (MCUs). The AVR-DA pair the latest Core Independent Peripherals (CIP) with a robust Intelligent Analog portfolio to create a device that not only excels as a standalone processor but also as a companion MCU in designs that demand precision. Furthermore, the high memory density of the AVR-DA family makes these MCUs well suited for communication stack intensive functions, both wired and wireless.

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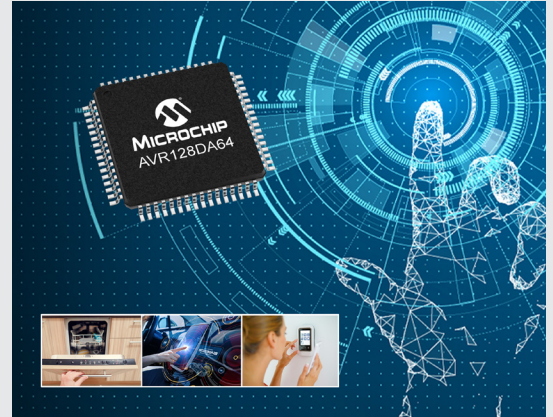
Next Generation AVR® MCUs

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 intelligent analog peripherals, like 12-bit differential ADC, Zero-Cross Detect (ZCD), 10-bit DAC and the latest generation Peripheral Touch Controller (PTC) with Driven Shield+ and Boost Mode technologies make the AVR-DA family ideal for low-latency control applications and capacitive touch user interfaces. The AVR-DA family is designed to bring capacitive touch sensing and real-time control functions to applications including industrial control, home appliance products, automotive and Internet of Things (IoT).

State of the Art Capactive Touch

The PTC offers built-in hardware for capacitive touch measurement on sensors that function as buttons, sliders, wheels and 2D surfaces. The PTC is designed to perform capacitive touch acquisition on sensors independently from the CPU, resulting in low CPU utilization and reduced power consumption.

The AVR-DA products support up to 46 self-capacitance and 529 mutual capacitance touch channels, which makes the AVR-DA family the perfect choice for human interface applications where multiple capacitive touch keys, sliders, wheels or 2D surface are required.
- Driven Shield+ for increased noise immunity and water tolerance when using self-capacitance touch sensing.
- Boost Mode for faster response time in high node count interfaces using mutual-capacitance touch sensing.

Functional Safety

The AVR-DA 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.

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Intelligent 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.

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

Key Features

- Internal 24 MHz oscillator
- Up to 64 KB of FLASH memory
- PTC with up to 46 self-cap and 529 mutual cap channels
- 12-bit differential ADC with up to 22-channels
- 10-bit DAC
- Analog Comparator with selectable reference inputs
- Up to three Zero Cross Detectors (ZCD)
- 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–5.5V operating voltage range
- –40°C to +125°C operating temperature range

Get Started Now

Getting started with AVR microcontrollers has never been easier! The AVR-DA MCUs are fully supported by our comprehensive development ecosystem, which includes MPLAB® X and Studio—our free Integrated Development Environments (IDEs) with built-in GCC compiler and our powerful MPLAB Code Configurator (MCC) and START code configuration tools.

Significantly reduce your development time with MCC or START—Microchip's intuitive, web-based graphical configuration tools for embedded projects. While you navigate through the easy-to-use interface, MCC and START generates factory-validated C-code to help you get your design started correctly. Get started today at www.microchip.com/mplab/mplab-code-configurator or start.atmel.com.

The AVR128DA48 Curiosity Nano is the ideal platform for rapid prototyping with the AVR-DA MCUs. The USB-powered kit features an on-board programmer/debugger that seamlessly integrates with MPLAB X and Studio.

For more information, visit Getting Started – AVR Microcontrollers.

Product	Max CPU speed (MHz)	Flash (KB)	EEPROM (B)	SRAM (KB)	Pins	I/O pins	10-bit differential ADC (channels)	10-bit DAC (output)	Analog Comparator	Peripheral Touch Controller (PTC)	PTC channels (self-/mutual cap)	Zero Cross Detectors	Event System channels	Window WDT	Configurable Custom Logic/(LUTs)	USART/SPI/I²C	16-bit Timer/Counters	12-bit Timer/Counter	Temp grade options (°C)	Packages
AVR128DA28	24	128	512	16	28	22	1(10)	4(1)	3	1	18/81	1	8	1	1(4)	3/2/1	4	1	Industrial, 85 Extended, 125	SPDIP, SOIC, SSOP
AVR128DA32	24	128	512	16	32	26	1(14)	4(1)	3	1	22/121	1	8	1	1(4)	3/2/2	4	1	Industrial, 85 Extended, 125	TQFP, VQFN
AVR128DA48	24	128	512	16	48	40	1(18)	4(1)	3	1	32/256	2	10	1	1(6)	5/2/2	5	1	Industrial, 85 Extended, 125	TQFP, VQFN
AVR128DA64	24	128	512	16	64	54	1(22)	4(1)	3	1	46/529	3	10	1	1(6)	6/2/2	6	1	Industrial, 85 Extended, 125	TQFP, VQFN

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