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STM32H5

Analog Peripherals:
ADC, DAC, VREFBUF, COMP,
OPAMP

Hello, and welcome to this presentation, that introduces the analog peripherals present in the STM32H5.

STM32H5 Analog Peripherals

Peripheral	Number of instances		Description
	STM32H503	STM32H573/STM32H56X	
ADC	1x 12-bit ADC	2x 12-bit ADC (ADC1, 2)	Successive approximation analog-to-digital converter
DAC	1x 12-bit DAC with two channels	1x 12-bit DAC with two channels	8- or 12-bit mode
VREFBUF	-	1x	Used as a voltage reference for the ADCs, DACs and also as a voltage reference for external components through the VREF+ pin Not available in the small package devices



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This table lists the analog peripherals integrated in the STM32H5 products.

The STM32H503 embeds a single instance of 12-bit Analog-to-Digital Converter (ADC), while the STM32H576 and STM32H56X embeds two instances.

This is a successive approximation analog-to-digital converter.

All STM32H5 microcontrollers support a Digital-to-Analog Converter (DAC) with two output channels, each with its own converter.

The DAC can be configured in 8- or 12-bit mode.

The STM32H573 and STM32H56X embed a voltage reference buffer that can be used as voltage reference for ADCs, DACs and also as voltage reference for external

components through the VREF+ pin.

The internal voltage reference buffer supports four voltages: 1.5 V, 1.8 V, 2.048 V and 2.5 V.

The VREF+ pin is double-bonded with VDDA on some packages. In these packages the internal voltage reference buffer is not available.

STM32H5 Analog Peripherals

Peripheral	Number of instances		Description
	STM32H503	STM32H573/STM32H56X	
COMP	1x	-	Ultra-low-power comparator The comparator has configurable plus and minus inputs used for flexible voltage selection: <ul style="list-style-type: none"> ➤ Multiplexed I/O pins ➤ DAC channel1 ➤ Internal reference voltage
OPAMP	1x	-	Operational Amplifier with gain bandwidth up to 7 MHz Two inputs and one output The three I/Os can be connected to the external pins, this enables any type of external interconnections The operational amplifier can be configured internally as a follower or as an amplifier with a non-inverting gain ranging from 2 to 16 The positive input can be connected to the internal DAC The output can be connected to the internal ADC



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The STM32H503 integrates a comparator with a programmable reference voltage, hysteresis and speed as well as selectable output polarity.

The comparator can be used for a variety of functions including:

- Wake-up from low-power mode triggered by an analog signal
- Analog signal conditioning
- Cycle-by-cycle current control loop when combined with a PWM output from a timer.

The STM32H503 also features one operational amplifier with two inputs and one output, supporting 7 MHz gain bandwidth.

The operational amplifier may reduce the need for an

external stand-alone OPAMP.

As this OPAMP can be configured in stand-alone mode with all terminals available for the user, it is possible to use them as a voltage follower, non-inverting and inverting amplifiers, as well as analog filters such as low- or high-pass filters. It can also act as a pre-amplifier for the ADC input.

Thank you

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Refer to the following presentations for a detailed description of analog peripherals:

- Comparators (COMP)
- Operational Amplifier (OPAMP)
- Voltage Reference Buffer (VREFBUF)
- Analog-to-Digital Converter and Digital-to-Analog Converter (ADC-DAC).