STM32U5

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

Hello, and welcome to this presentation, which introduces the analog peripherals present in the STM32U5.

STM32U5 Analog Peripherals

Peripheral	Number of instances	Description
ADC	Two * 14-bit ADC (ADC1/ADC2) One 12-bit ADC (ADC4)	Successive approximation analog-to-digital converters - ADC1/ADC2: 14-, 12-, 10- or 8-bit configurable resolution - ADC4: 12-bit, 10-bit, 8-bit or 6-bit configurable resolution
DAC	One 12-bit DAC with two channels	8- or 12-bit mode
VREFBUF	One	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 LQFP48, UFQFPN48, LQFP64 and WLCSP90 packages

* depends on product

STM32U5 products integrate up to two 14-bit ADCs, one 12-bit ADC, two 12-bit DACs, VREF voltage buffer, two Comparators and two OPAMPs. Refer to the product datasheets for availability of analog peripherals. ADC1 and ADC2 have a 14-bit maximum resolution while ADC4 has a 12-bit maximum resolution.

The DAC module embeds two independent 12-bit converters.

The VREFBUF provides a voltage reference that can be used internally by the ADCs and DAC and also externally through the VREF+ pin.

The VREFBUF is not available in packages with a low pin count.

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Peripheral	Number of instances	Description
Comparators	Two*	Each comparator has configurable plus and minus inputs used for flexible voltage selection: – Multiplexed I/O pins – DAC channel1 and channel2 – Internal reference voltage
Operational Amplifier (OPAMP)	Two*	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

* depends on product

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Comparators can be used for a variety of functions including:
- Wake-up from low-power mode triggered by an analog signal
- Analog signal conditioning, and
- Cycle-by-cycle current control loop when combined with a PWM output from a timer.

Comparator inputs can be internally connected to the DAC channels.

The operational amplifiers may reduce the need for an external stand-alone OPAMP. As these OPAMPs 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. They can also act as a pre-amplifier for the ADC input.

Thank you

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).