ACMP
Analog Comparator

XMC™ microcontrollers

September 2016

Agenda

1. ACMP – general features
2. Application example
3. ACMP – additional features
4. Support material

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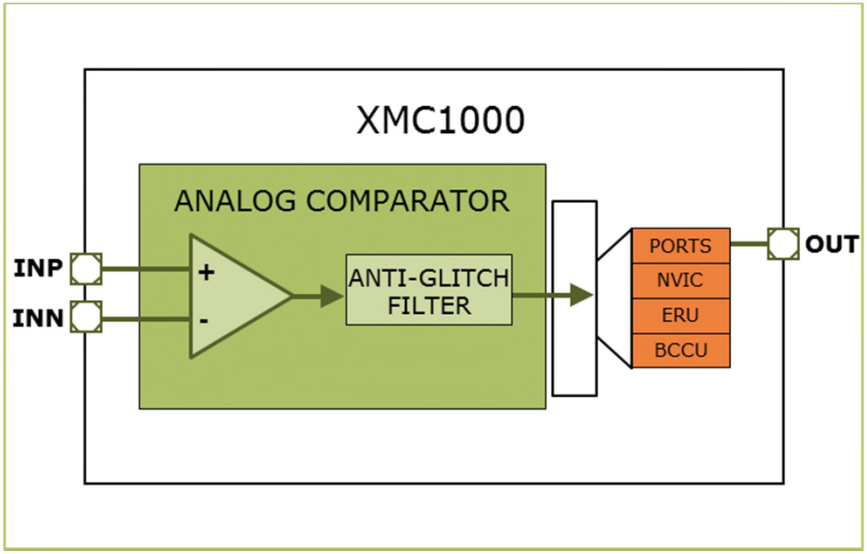
ACMP
Analog Comparator



Highlights

XMC1000 provides up to three Analog Comparators.

Each Analog Comparator is realized with low input offset voltage and short propagation delay.

The output signal can be routed to a port pin directly or used by the various peripherals of the MCU.

Key feature

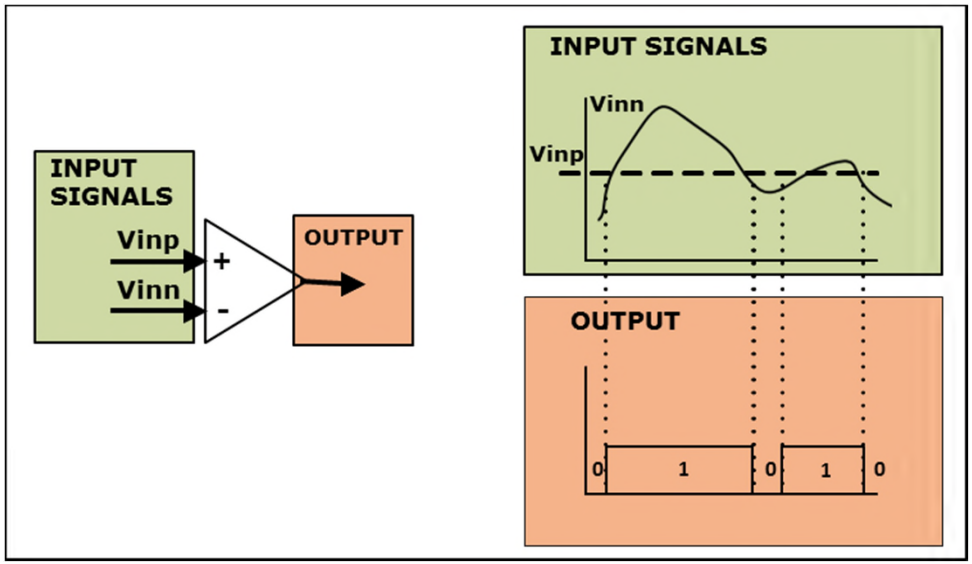
- Fast and precise Analog Comparator
- Anti-glitch filter
- Programmable hysteresis

Customer benefits

- In power conversion, fast and precise response improves the control quality
- The anti-glitch filter absorbs undesired spikes in the compared signal
- Prevent from generation of unintended edges due to noise in the input signal

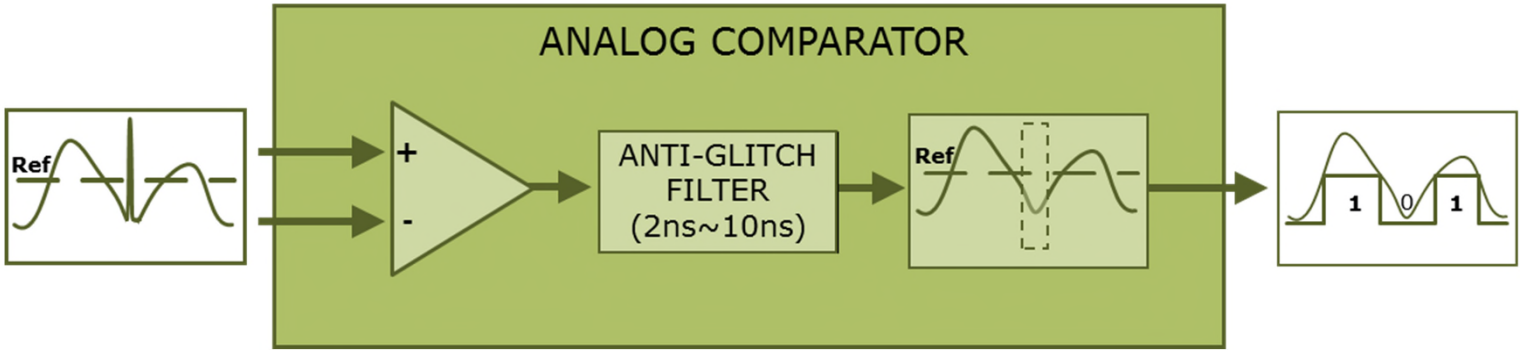
ACMP
Fast and precise Analog Comparator

- Fast and precise:
  - The Analog Comparator has a really short response time with a short propagation delay (25 ns); it also has very low input offset voltage (3 mV) making it highly accurate
  - Those two features make the ACMP module ideal for power conversion applications, which need real-time and precise signal level comparisons



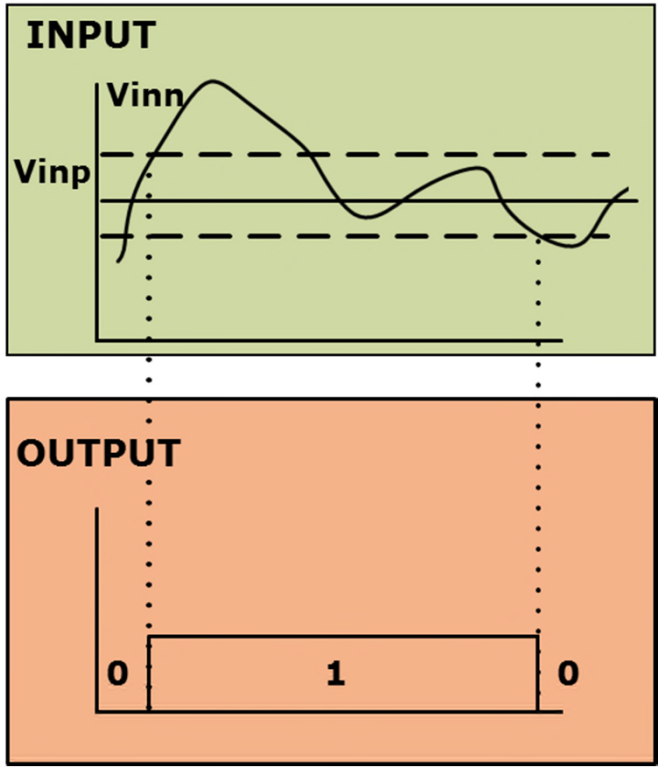
ACMP
Anti-glich filter

- A filter (if enabled) absorbs generated spikes
  - When this filtering operation is added to the ACMP output, the propagation delay is increased by just a few nanoseconds (between 2 ns and 10 ns)

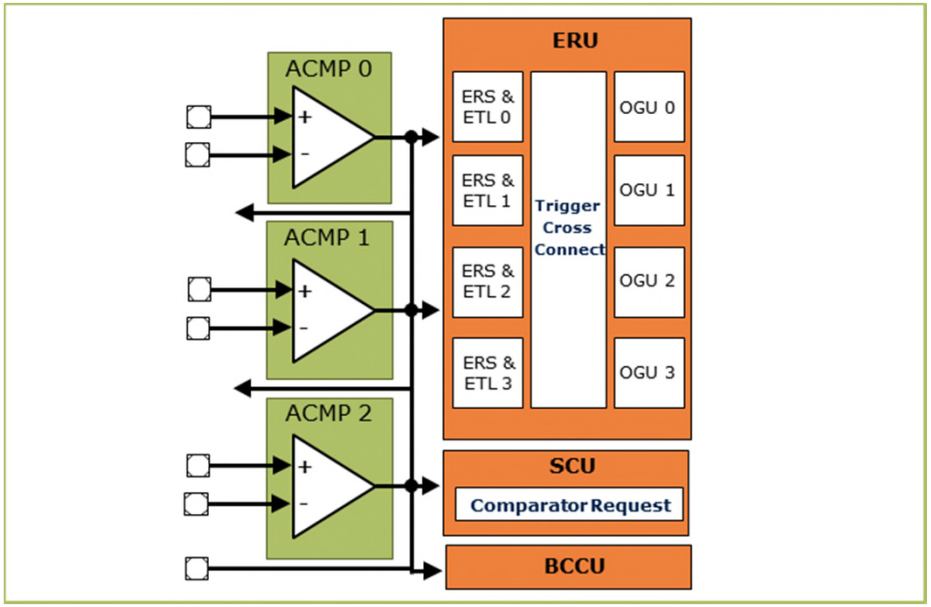


ACMP
Programmable hysteresis

- A slowly varying signal with even small amounts of noise could produce unintended comparator output transitions
- A hysteresis voltage reduces the noise sensibility of the Analog Comparator
  - The configurable values for the voltage hysteresis are:
    - 10 mV
    - 15 mV
    - 20 mV



ACMP
System integration



XMC1100	XMC1200	XMC1300
	●	●

The output signals of ACMP are available at the input multiplexer of the event request unit ERU. As a result, they can be flexibly combined to logical signals that trigger interrupts, start timers or trigger ADC measurements.

It is the unique combination of fast analog signals and the powerful peripherals that provide a solution in various demanding control applications.

The fast ACMP is functional in a wide supply voltage range (-0.05 V~6 V).

- Target applications
  - Power conversion
  - Motor control
  - Intelligent lighting
  - General purpose

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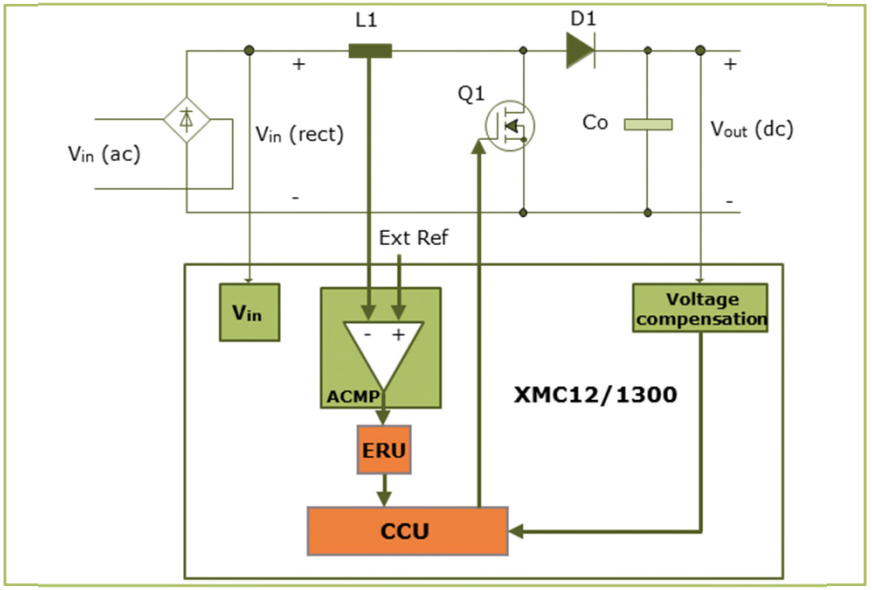
Application example – Zero Crossing Detection in Power Factor Correction



In brief

Analog Comparator can be used as Zero Crossing Detector in Power Factor Correction, applications saving internal (ADC) and external (external comparators) resources.

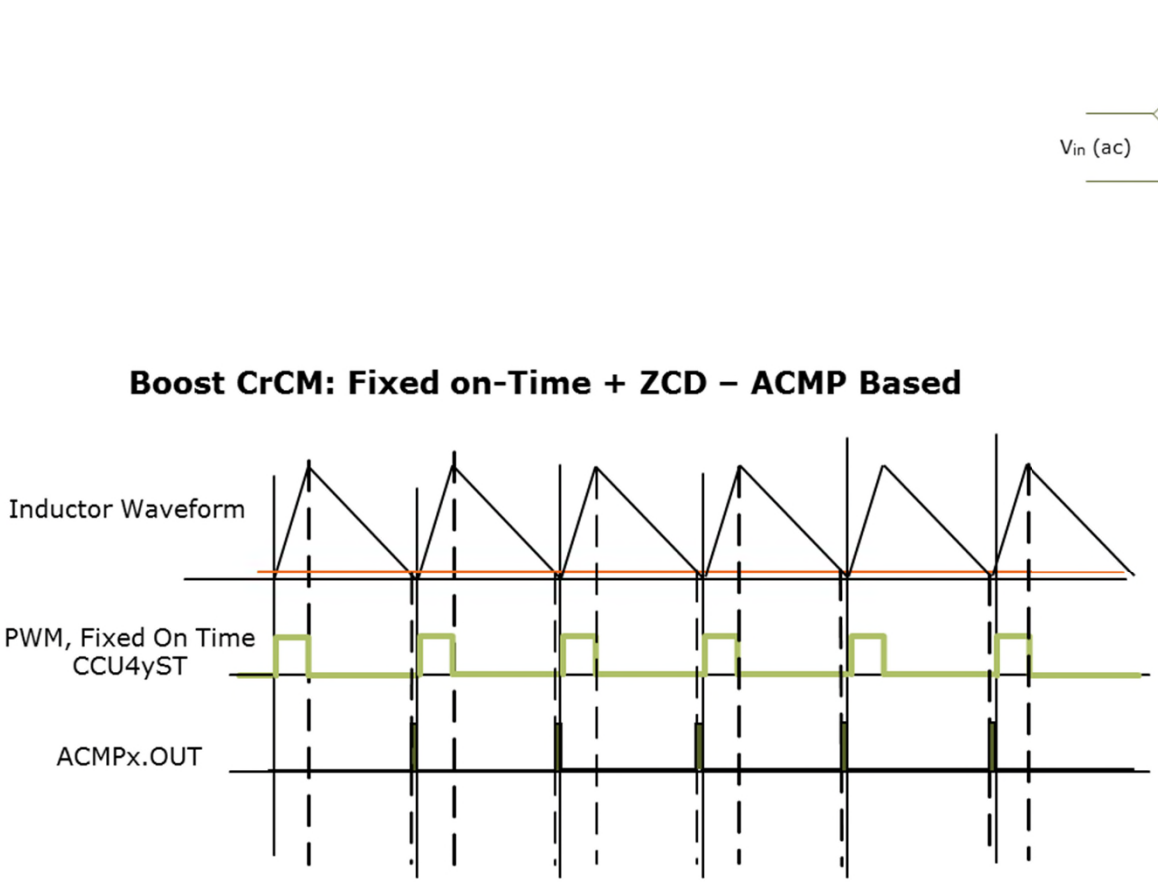
Overview

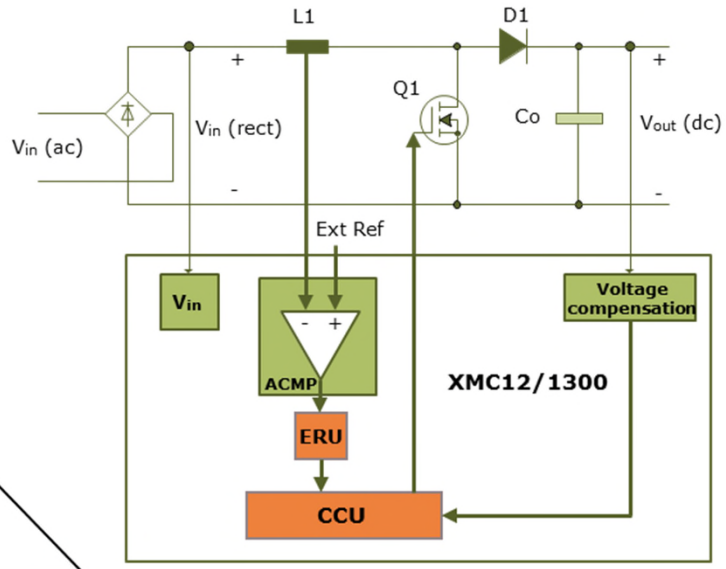
In Power Factor Correction (PFC), Zero Crossing Detection (ZCD) is widely used as current control method. There are many ways of detecting the ZCD instant.

An easy and efficient manner is using one of the XMC1000 internal fast Analog Comparator.

In this example, a PFC using a boost converter topology and implementing fixed on-Time and Zero Crossing Detection as Current Control Method (CrCM) is shown. When the current in the inductor (L1) crosses a fixed value close to 0, the ACMP reacts triggering the desired PWM changes in the CCU through the ERU.

Application example – Zero Crossing Detection in Power Factor Correction





Application example ZCD in Power Factor Correction

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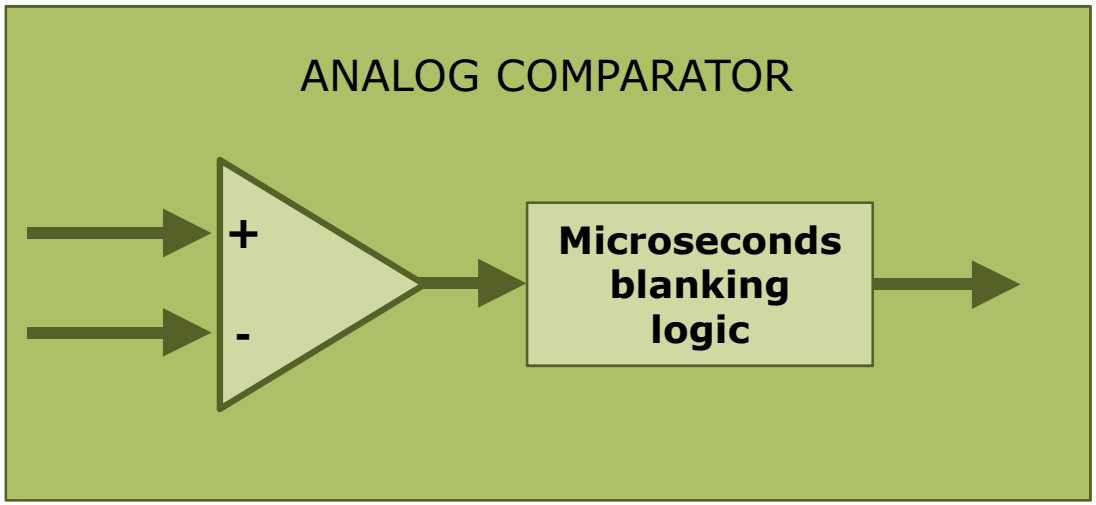
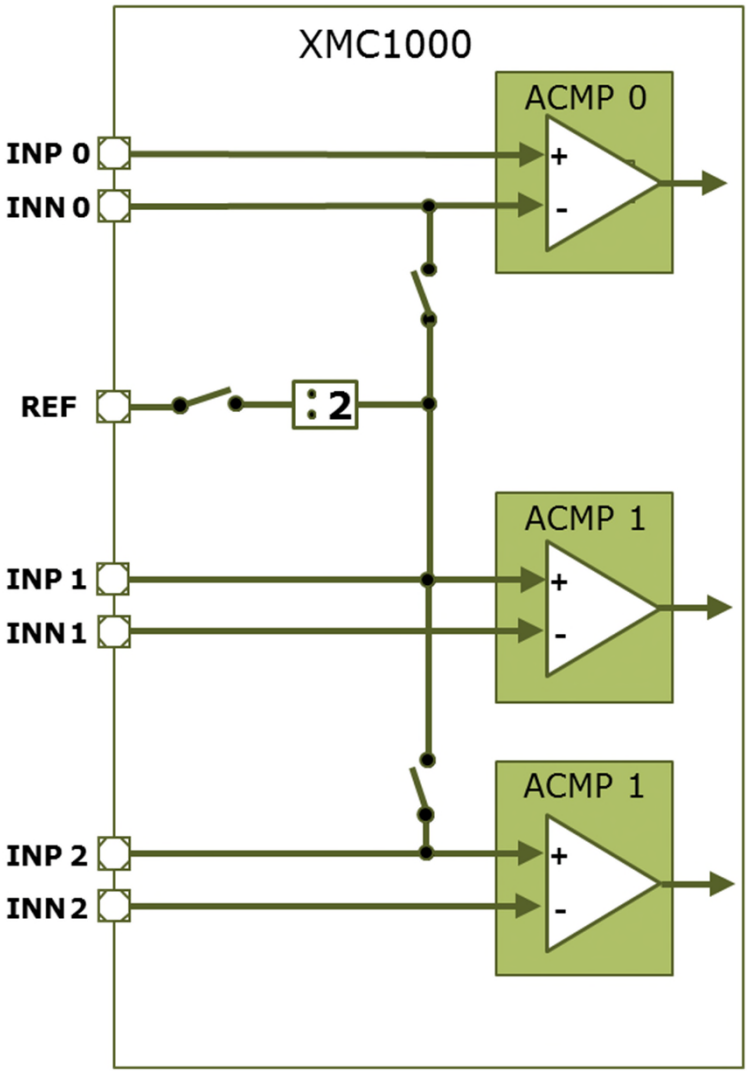
ACMP – additional features
Blanking

- A blanking feature is added to ensure a stable output when
  - enabling the Analog Comparator module
  - releasing the Analog Comparator from a low power state
- It adds some blanking time in a range of few microseconds to prevent from undefined states at the comparator's output



ACMP – additional features
Common reference voltage

- The same reference signal, divided by two, can be used by various Analog Comparators



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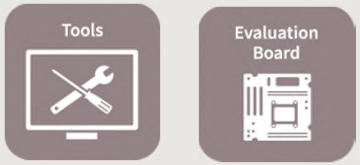
Support material

Collaterals and brochures 	› Product briefs › Selection guides › Application brochures › Presentations › Press releases, ads	› www.infineon.com/XMC
Technical material 	› Application notes › Technical articles › Simulation models › Datasheets, MCDS files › PCB design data	› www.infineon.com/XMC › Kits and Boards › DAVE™ › Software and Tool Ecosystem
Videos 	› Technical videos › Product information Videos	› Infineon Media Center › XMC™ Mediathek
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