



TMADC

Time-Multiplexed Analog-to-Digital Converter

AURIX™ TC4xx Microcontroller

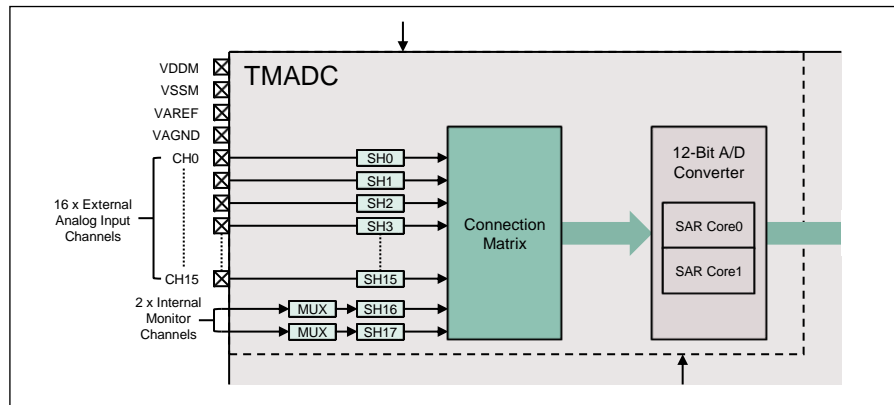
V1.0.0 2024-09

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Time-Multiplexed Analog-to-Digital Converter



Highlights

- › The Time-Multiplexed Analog-to-Digital Converter (TMADC) is used for fast signal conversion on single or group channel inputs
- › 12-bit analog to digital conversion of up to 16 external analog input channels
- › Each input channel has its own sample and hold unit (SH)
- › 2 Successive Approximation Register (SAR) cores for each TMADC
- › Maximum output sample-rate of 4 MSPS

Key Features

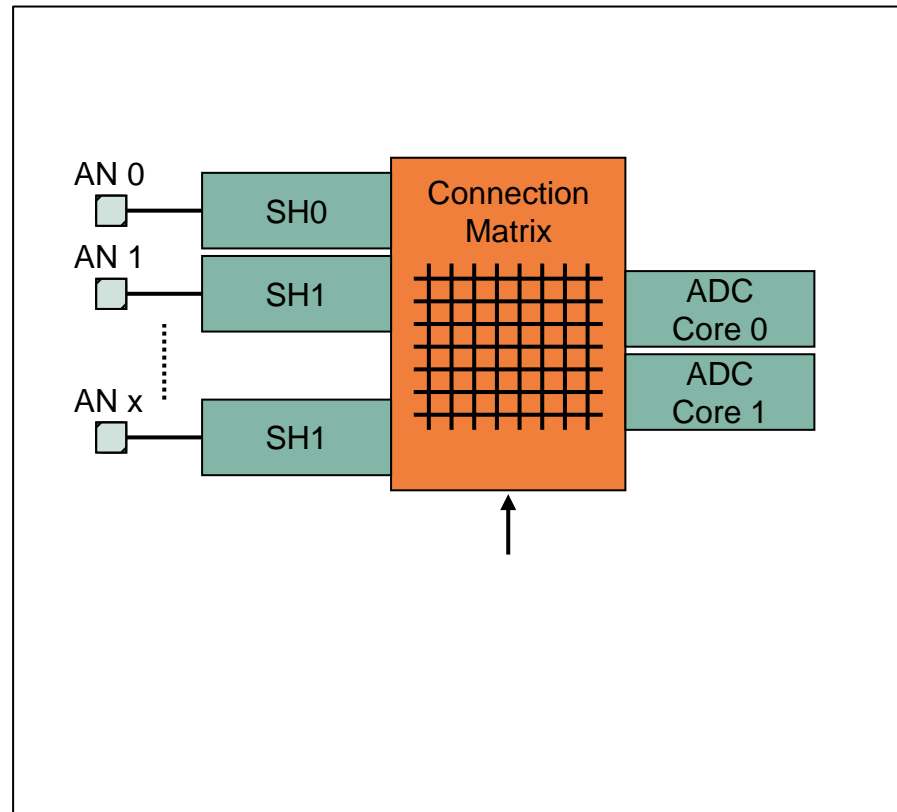
Flexible trigger source selection

Powerful conversion result handling

Customer Benefits

- › Simplified conversion triggers
- › Synchronous sampling support on multiple input channels
- › Independent channel specific result registers
- › Interrupt can be generated only in case result exceeds defined range

- › Connection matrix enables the user to configure:
 - Programmable arbitrary conversion sequence (single or repeated)
 - No more “queue” conversion request like in AURIX™ TC3xx. User just needs to specify the trigger for each channel
 - No limitation on the number of channels that are sharing the same trigger
 - Conversions triggered by software, timer events, or external events
 - Each TMADC converter has 2 conversion cores. User can assign input channels to any of the 2 cores
 - Sample time adjustable to adapt to sensors and reference



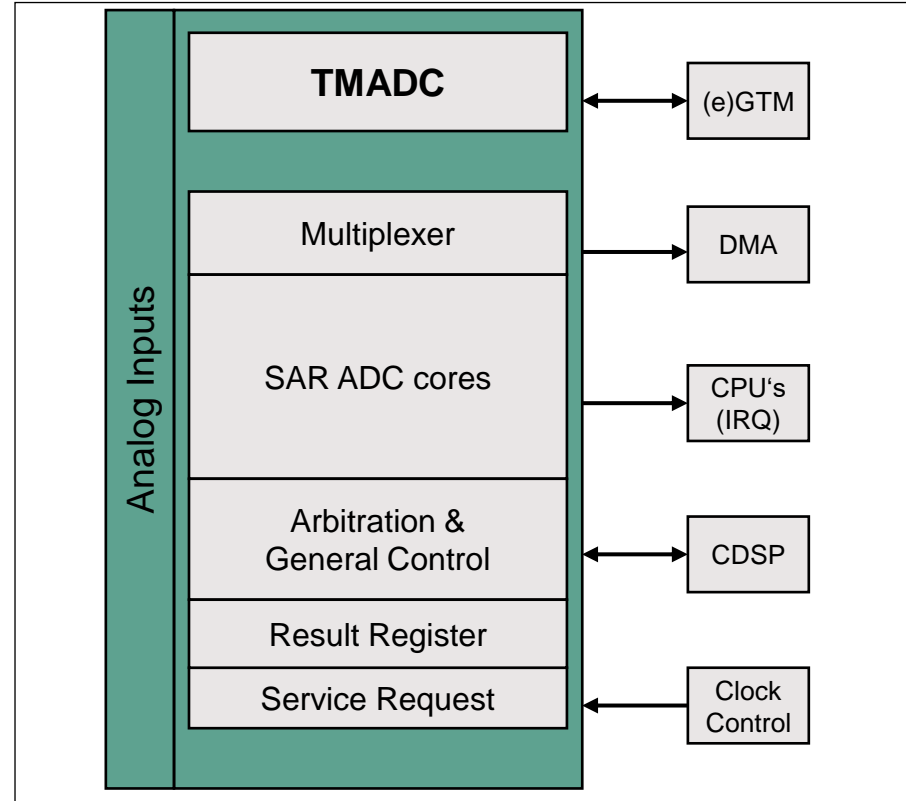
Powerful conversion result handling

- › It is possible to assign result register X for input channel Y. This enables a connection to the timer module and the Converter Digital Signal Processing (CDSP), since they can only fetch results from fixed result registers
- › Wait-for-Read mode stalls further subsequent conversions in order to avoid data loss
- › Burst read access support for time-stamp and result registers
- › Configurable limit checking against programmable border values. Interrupt will only be generated in case of need (error, result or boundary events)
- › Limit check on conversion results for up to two independent input channels. Alarm can be generated when both channels exceed respective thresholds, or at least one channel exceeds its threshold

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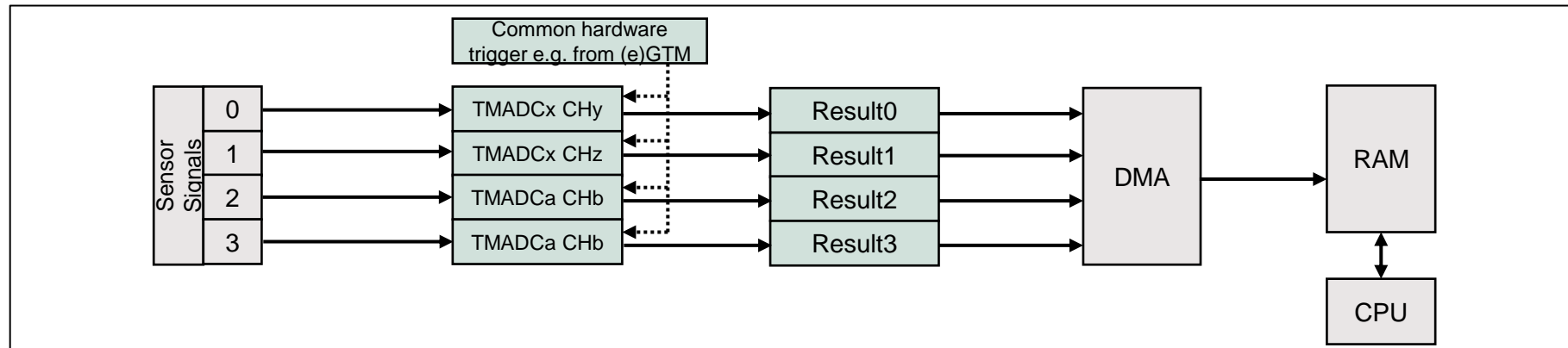
System integration

- › The analog inputs are connected to TMADC Converters which convert analog input values (voltages) to discrete digital values
- › Each TMADC converter can operate independently of the others
- › TMADC result can be post processed by CDSP or GTM (MCS)
- › The interrupts can signal events like errors or out of boundary results
- › The Direct Memory Access (DMA) can be used for handling the results



Application example

Synchronized conversions



Overview

- › Synchronized Conversions for parallel sampling
- › Result handling via DMA (Direct Memory Access)

Advantages

- › Multiple analog input channels can finish sampling simultaneously (synchronized), with their own sample and hold units
- › These input channels can be on the same TMADC converter, or on multiple TMADC converters
- › No limitation on the number of synchronized input channels

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Edition 2024-09

**Published by
Infineon Technologies AG
81726 Munich, Germany**

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**Document reference
AURIX_Time-
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