

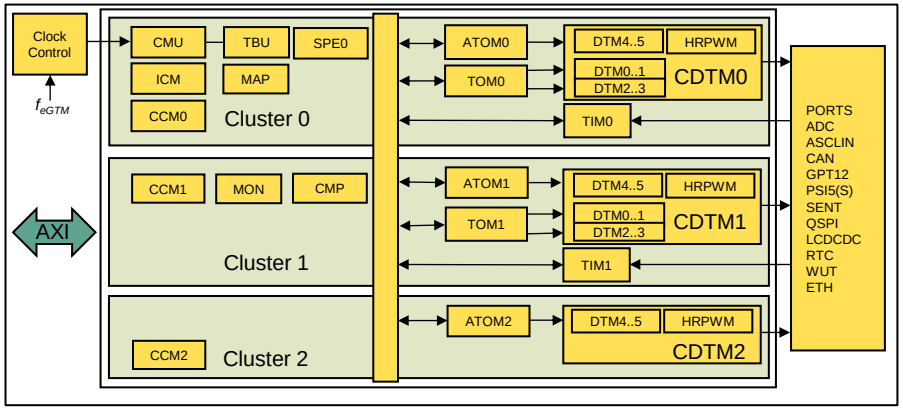
eGTM
Enhanced Generic Timer Module

AURIX™ TC4xx Microcontroller

V1.0.0 2024-09

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eGTM
Enhanced Generic timer module



Highlights

The eGTM module is capable of driving different kinds of pulse-width-modulated (PWM) signals with and without dead-time. It is optimized for electrical drive and applications with high resolution support on ATOMs. It is able to capture signals from ports. Clusters can run up to 400MHz

Key Features

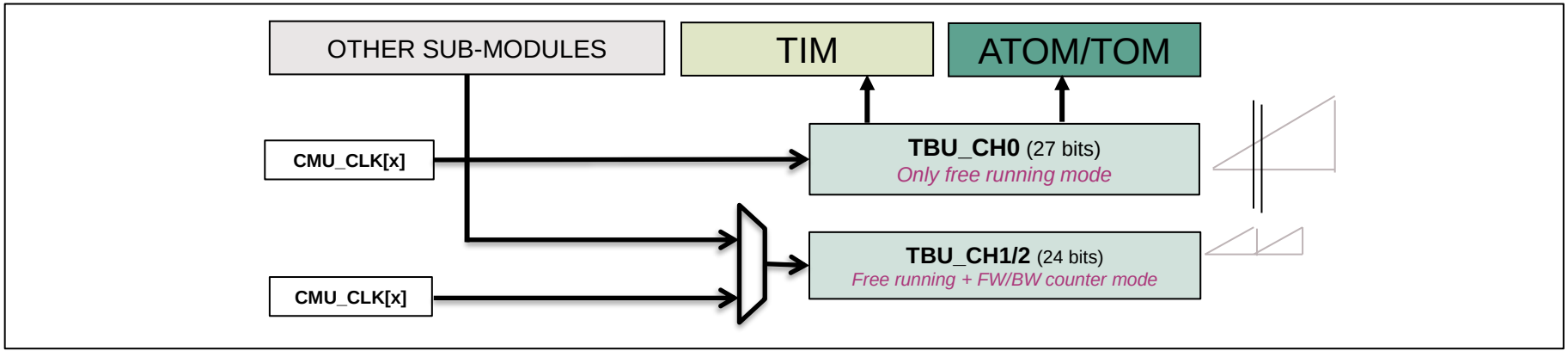
- Common time base
- High resolution support on ATOMs
- Brush-less DC motor (BLDC) support

Customer Benefits

- Synchronize events in the timer using a common time base (CTBM)
- Generate high resolution PWM signals up to 152.6 ps (200 MHz) or 148ps (225 MHz)
- Brush-less DC motor control in HW. Reduced software overhead

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eGTM
Common time base

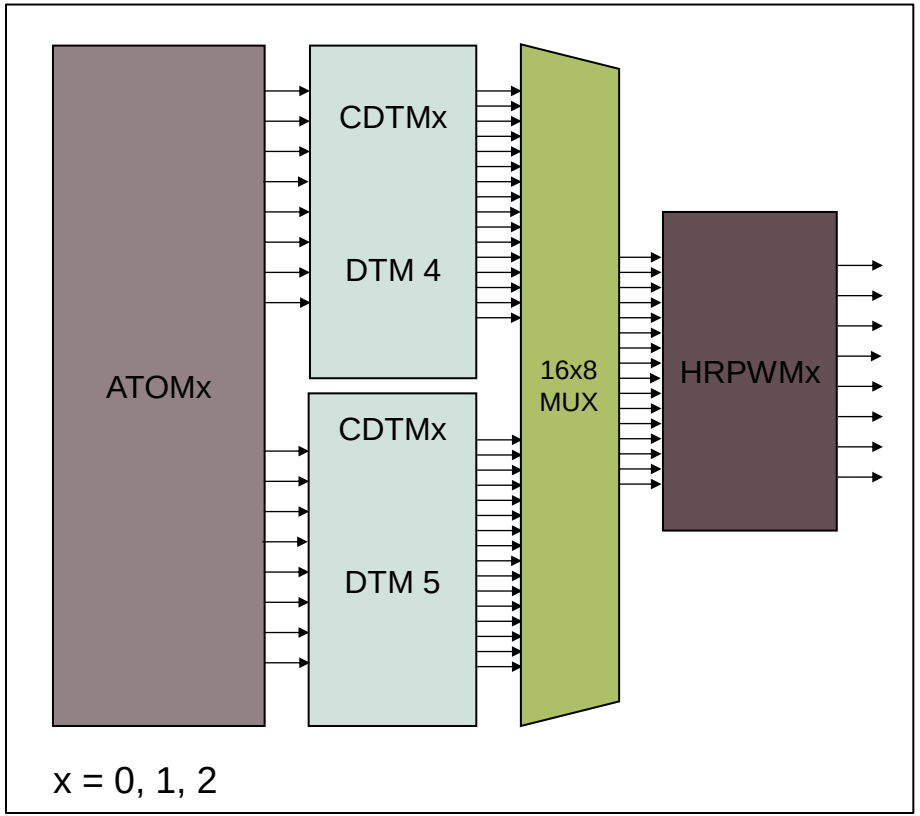


- eGTM provides common-time base through the Time Base Unit (TBU) within the sub-module CTBM (Common time-base module)
- Common time-base provides ability to synchronize events in different sub-modules within eGTM
- Benefits:
  - Timestamp from TBU on input events
  - Use timestamp from TBU as reference to achieve synchronous start of events between various timer outputs

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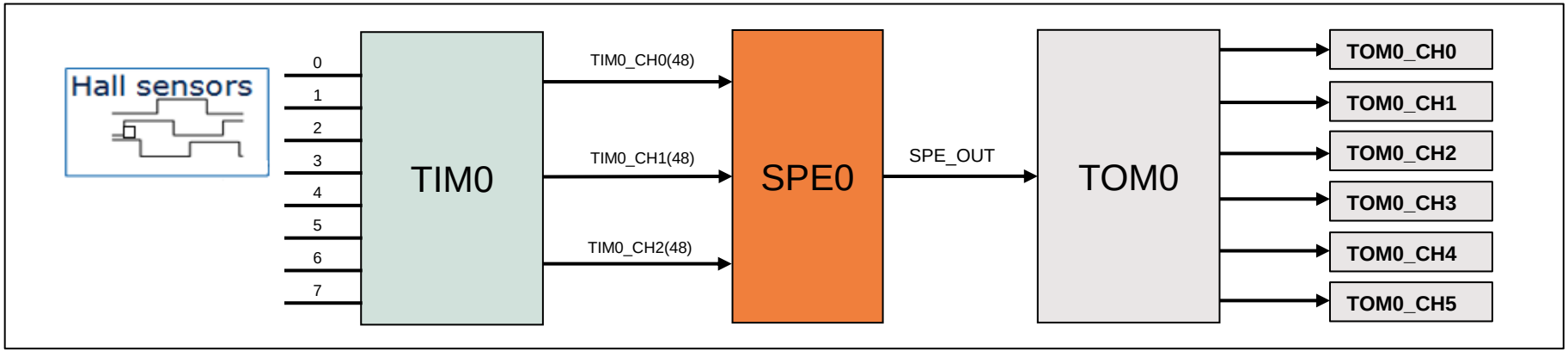
eGTM
High resolution support on ATOMs

- The HRPWMx (x = 0, 1, 2), increases the resolution of the incoming base PWM signal by providing finer control of rise and fall edges with the help of DLL and phase selectors
- eGTM-High resolution(HR): constitutes of the eGTM functional block, which is delivering the base PWM output signals along with additional output signals to control the micro steps in the HRPWM module
- Clock control for HRPWM: The clock, synchronized to the generated base PWM signal, is also provided to the HRPWM



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eGTM
BLDC motor support

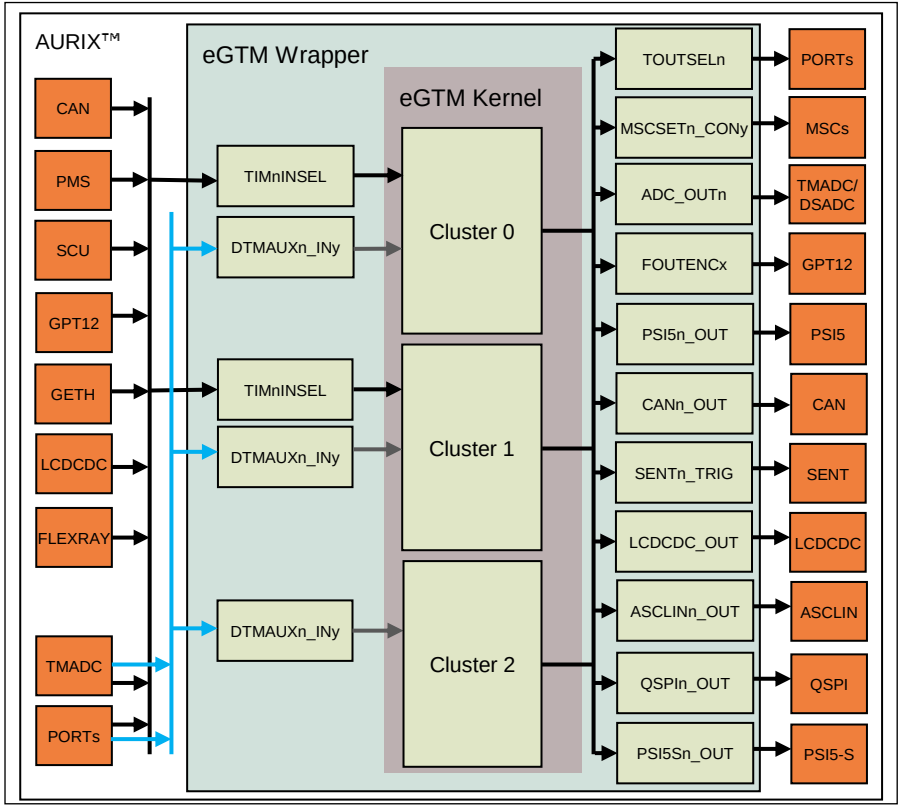


- Hardware support for Brush-less DC motor drive using the Signal pattern evaluation (SPE) sub-module along with Timer Input and Output Modules (TIM/(A)TOM) respectively
- Benefits:
  - Pattern matching algorithm in hardware
  - Rotation direction & validity detection
  - Possible to generate interrupts on specific rotation

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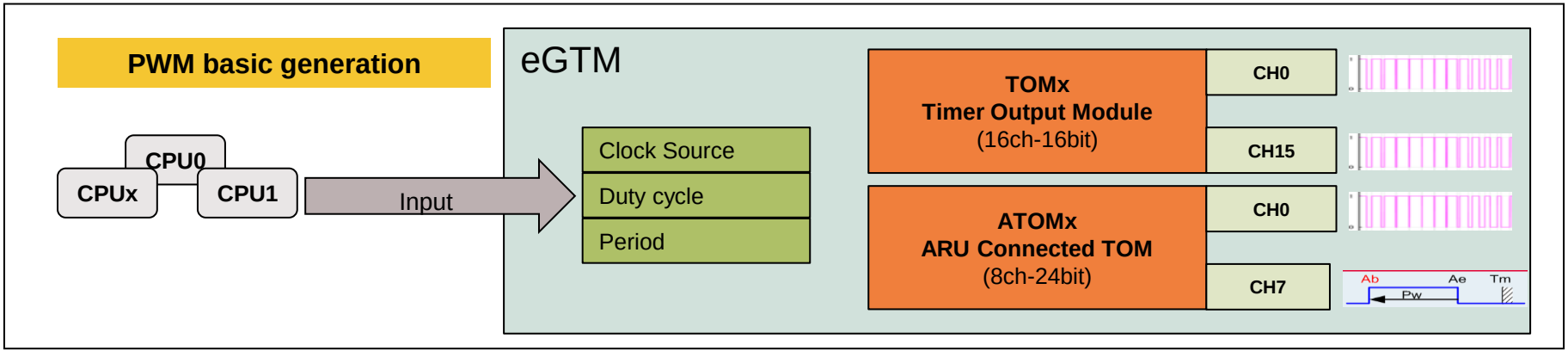
eGTM
System integration

- eGTM is integrated in AURIX™ to provide flexible set of connections to other peripherals
- This includes:
  - PWM output & input to/from multiple ports
  - Triggers inputs to: ADC, SENT, PSI5(S), PMS, ASCLIN, QSPI, CAN, and MSC
  - Triggers from: CAN, Ethernet, SCU, PMS, GPT, ADC, and FlexRay™
  - Filtered outputs can be provided from eGTM Timer Input Modules (TIMs) to GPT12
  - ADC: Boundary flags provided as input to TIMs and to DTMs (Auxiliary interface)



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Application example
Digital PWM output



Overview

- PWM generation with multiple channels with 16 or 24-bit resolution with as low as 10 ns granularity
- ATOM has variety of modes of operation to support different PWM outputs
- Data reception using the ARU on ATOM

Advantages

- Dynamic PWM generation with input of period/duty via the ARU
- Channel counter can be triggered/reset by its predecessor to achieve control of multiple channels with a reference channel

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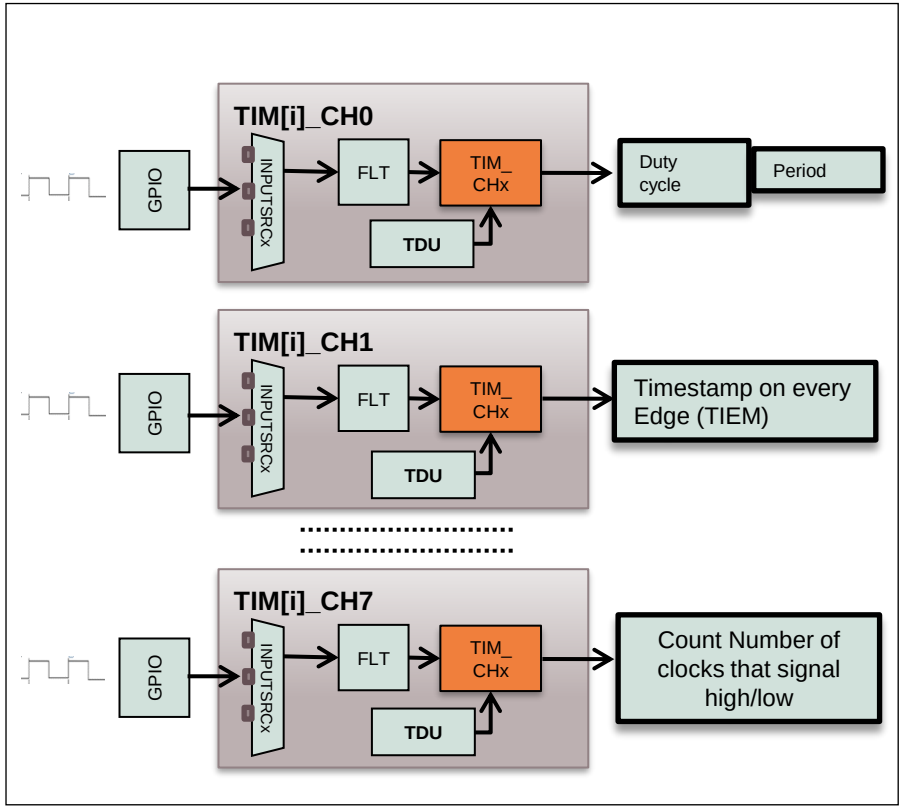
Application example
Digital input acquisition

Overview

- Each Timer input module (TIM) with 8 independent channels for input capture/measurements, each with its own filter module
- Multiple modes to support different measurements including period/duty, timestamp on desired active edges

Advantages

- Digital filtering of input PWM with glitches in hardware
- Time out detection using TDU (Timeout Detection Unit) within each TIM channel
- Routing TIM channel output results via ARU to other sub-modules without interrupts



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