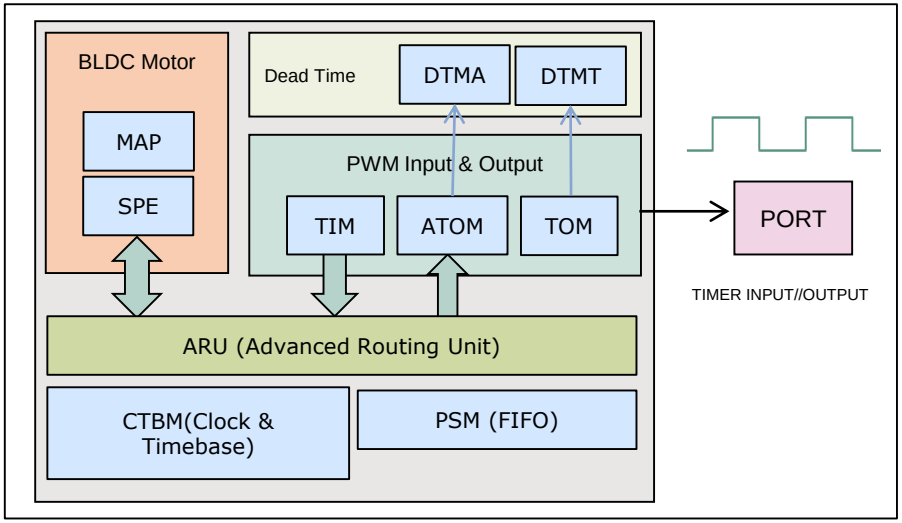
GTM

Generic Timer Module

AURIX™ TC2xx Microcontroller Training
V1.0 2019-03

GTM
Generic Timer Module



Highlights

GTM is a modular timer unit designed to accommodate many timer applications including dynamic digital PWM output, digital acquisition with filtering, motor control including BLDC. Timer resolution up to 24 bits with up to 10 ns time granularity

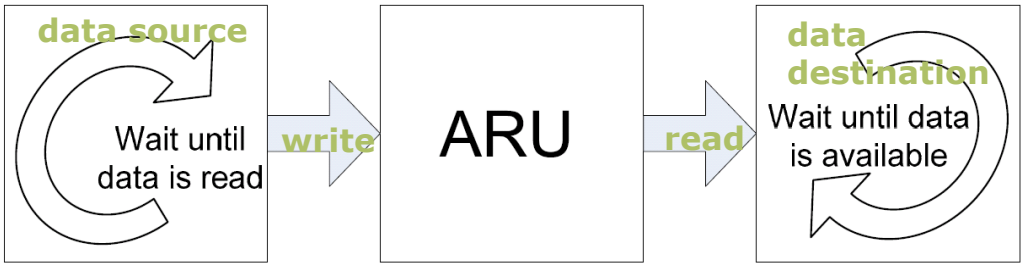
Key Features

Advanced routing
Brush-less DC motor (BLDC) Support
Common time base

Customer Benefits

Route information in hardware between sub-modules
Brush-less DC motor control in HW. Reduced software overhead
Synchronize events in the timer using a common time base (CTBM)

GTM
Advanced routing



- GTM has an inbuilt advanced router unit (ARU) that can be used to exchange specific data between sub-modules
- Routing follows round-robin scheduling
- Benefits:
  - Fixed round-trip time leads to deterministic scheduling
  - No need for a internal interrupt mechanism to exchange data

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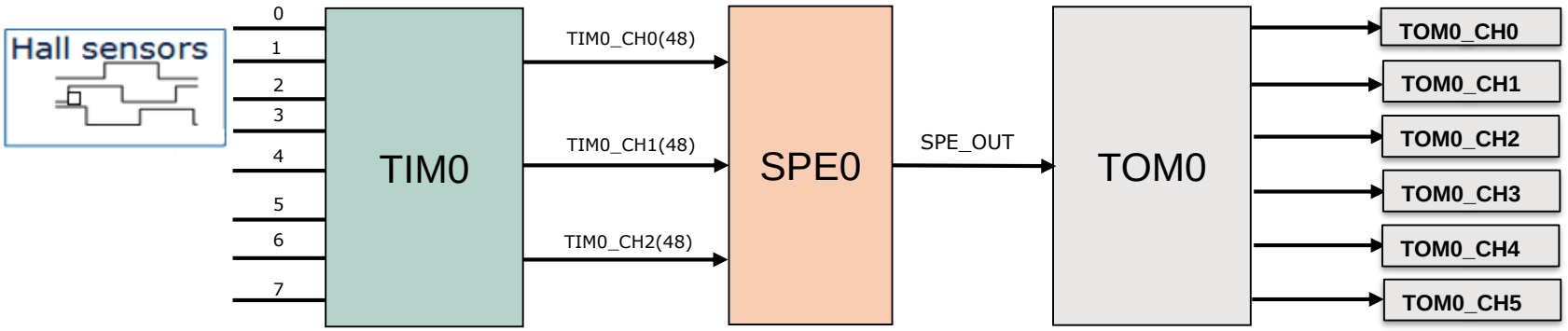
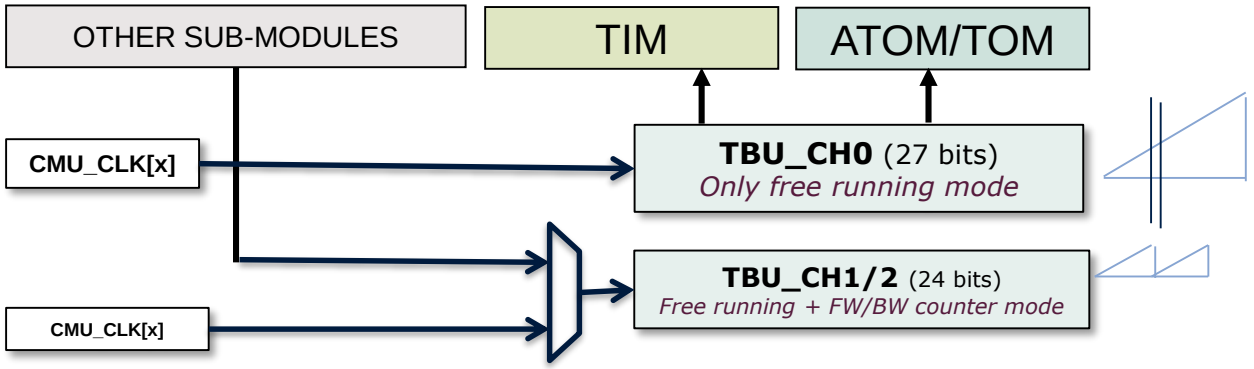
BLDC motor support



- Hardware support for Brush-less DC motor drive using the Signal pattern evaluation (SPE) sub-module along 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

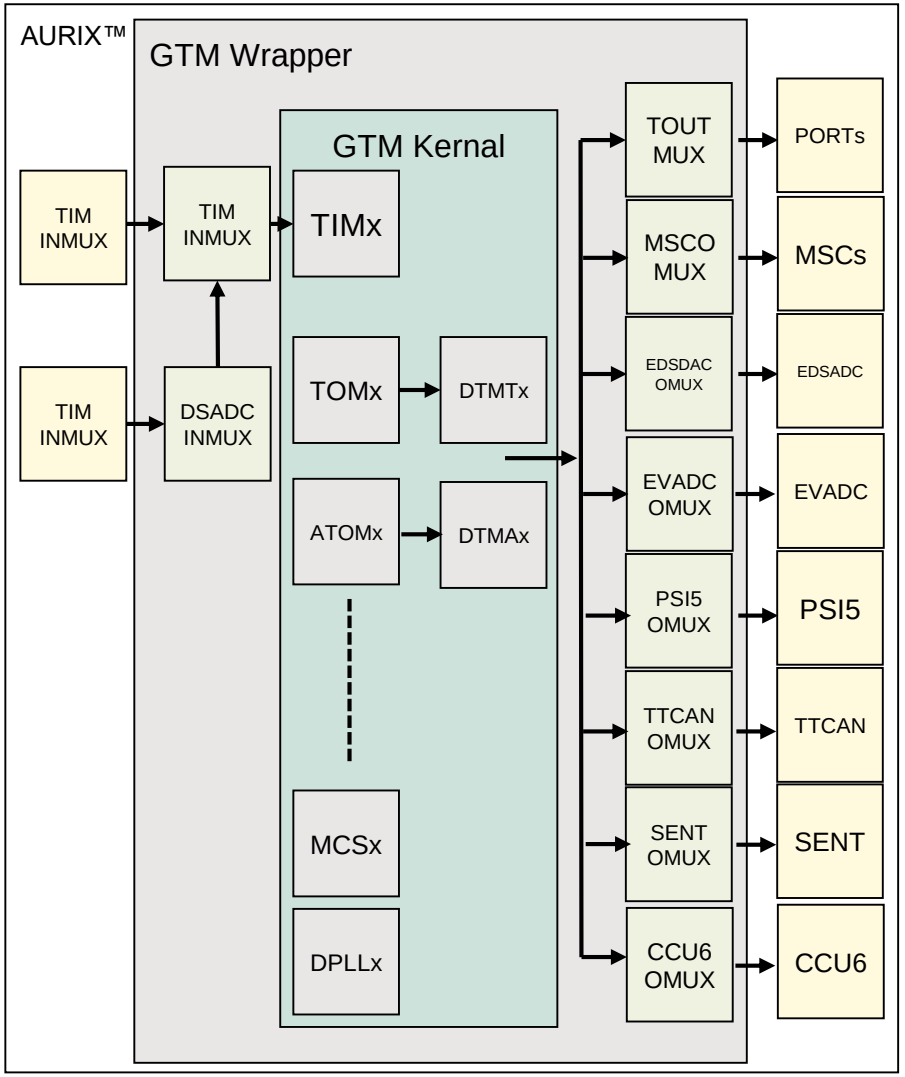
GTM
Common time base



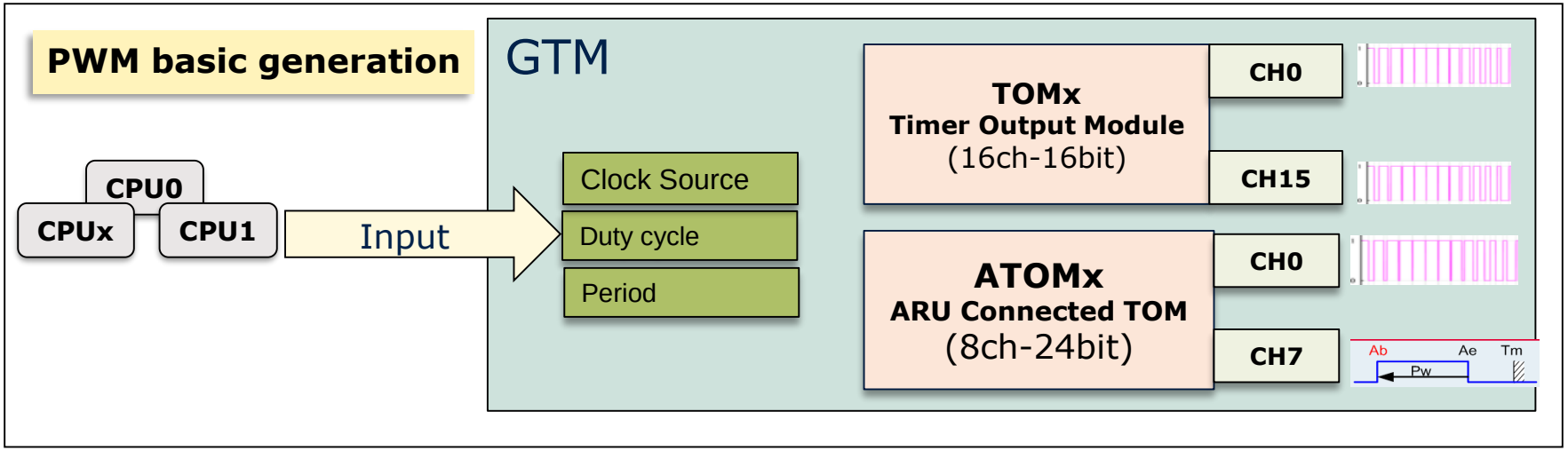
- GTM provides common-time base through the Time base unit (TBU) within the CTBM (Common time-base module) sub-module
- Common time-base provides ability to synchronize events in different sub-modules within GTM
- Benefits:
  - Timestamp from TBU on input events
  - Use timestamp from TBU as reference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

GTM
System integration

- GTM is integrated in AURIX™ to provides flexible set of connections to other peripherals
- This includes:
  - PWM output & input to/from multiple ports
  - Trigger inputs to ADCs as well services request event inputs from ADC to GTM-TIM/DTMx
  - Trigger inputs to SENT, CAN, MSC and PSi5/PSi5S
  - Direct internal connectivity of timer output to CCU6 timer input for measurements



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 multipe channels with a reference channel

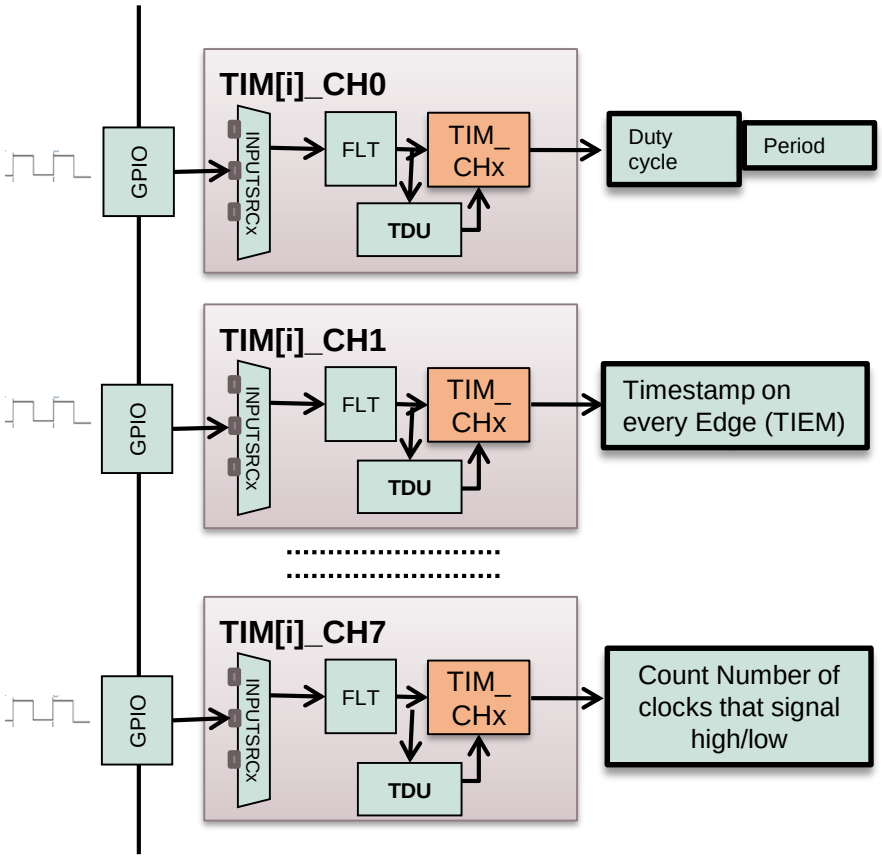
Application example
Digital input acquisition

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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