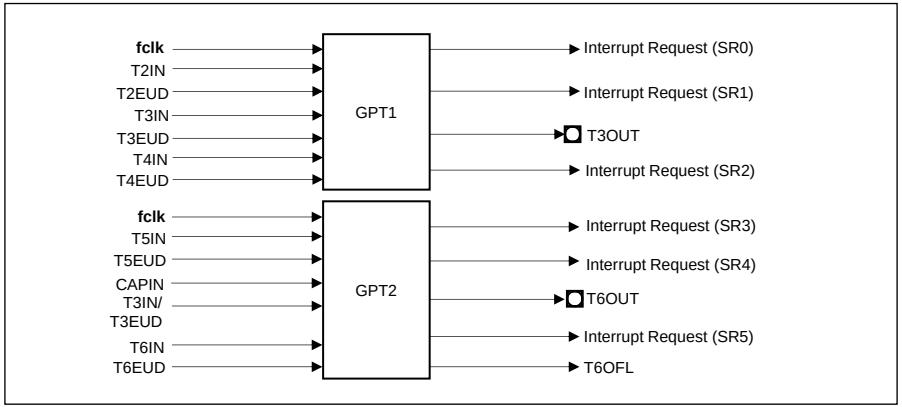
GPT12
General Purpose Timer

AURIX™ TC4xx Microcontroller

V1.0.0 2024-09

GPT12
General purpose timer unit



Highlights

- The General Purpose Timer Unit (GPT12) is used for timing, event counting, pulse width measurement and pulse generation
- The five 16 bit timers are grouped in two timer blocks GPT1 and GPT2

Key Features

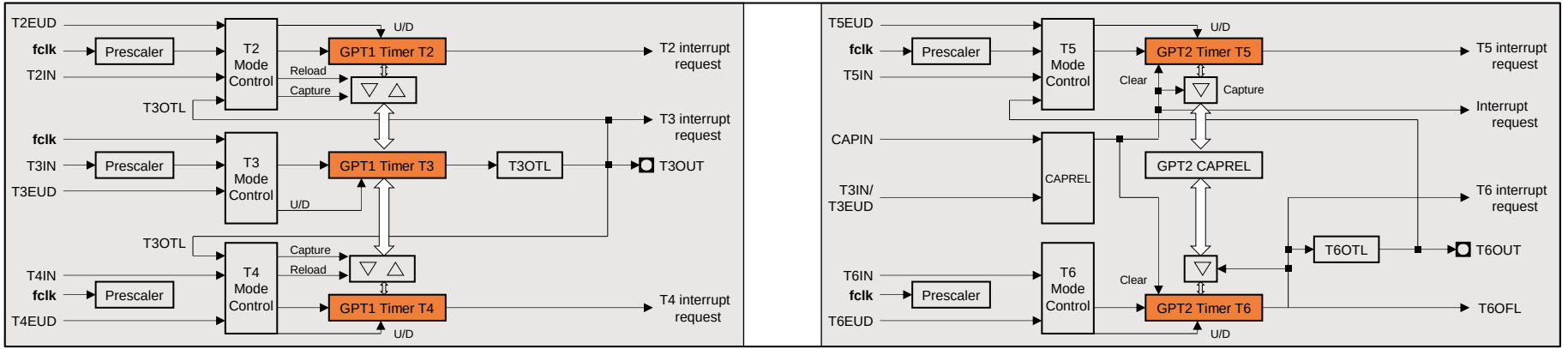
Each timer/counter generates interrupt request

Incremental interface mode

Customer Benefits

- Application software can be executed based on an event
- Fits perfectly to electrical drive applications with encoder

GPT12
Each timer/counter generates interrupt request



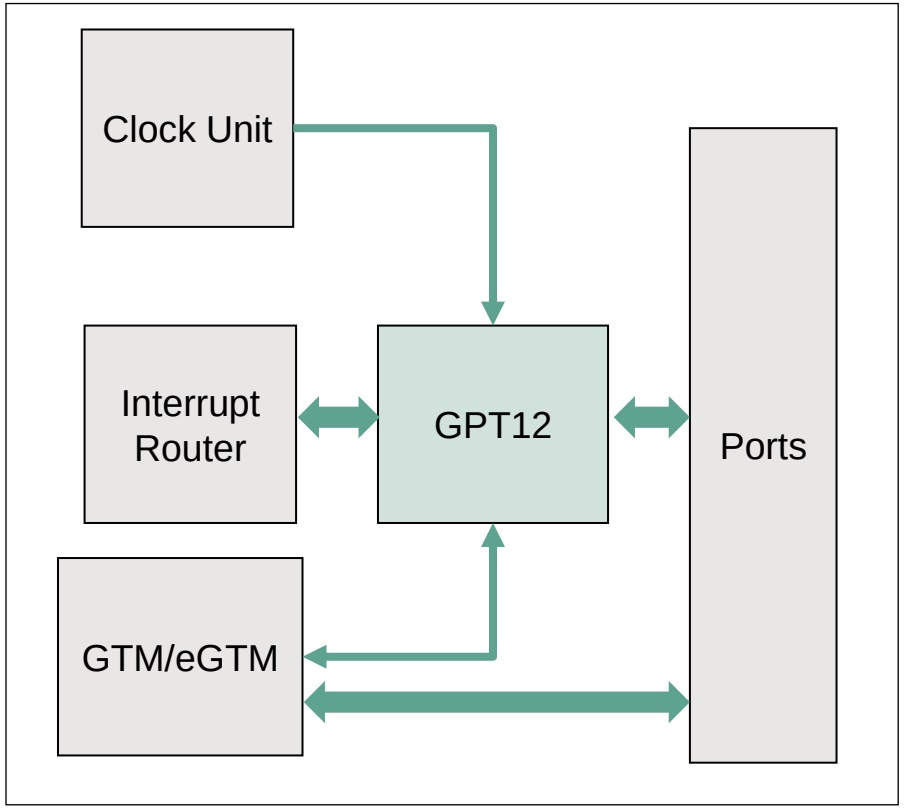
- Separate interrupt for each timer
  - GPT1
    - Each timer generates a separate interrupt request
  - GPT2
    - Timer T5 and Timer T6 generates a separate interrupt request
    - External transition detection interrupt request (CAPIN)

GPT12
Incremental interface mode

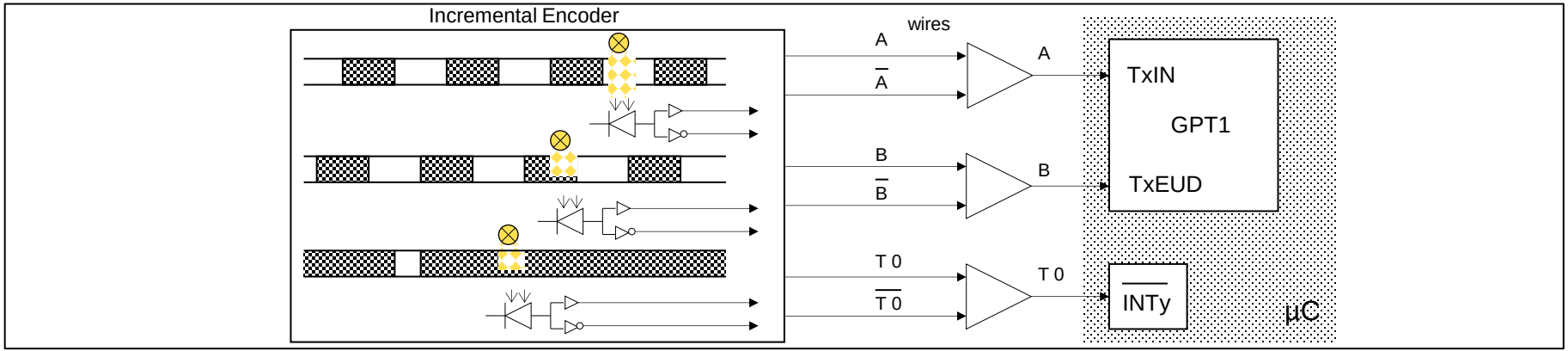
- For low rotational speeds:
  - interrupt generation for each detected edge
  - can be used to capture elapsed time and start speed control algorithm
- Detection of the rotational direction:
  - status bit indicating the current direction
  - can be easily used to reset / load the counter in the case of a T0 event (mechanical zero position of a motor)
  - status bit indicating a direction change
  - interrupt generation allows faster reaction in case of a direction change.
- Status flags are independent from interrupt generation, therefore control of GPT12 can be done without interrupts

GPT12
System integration

- The General Purpose Timer Unit blocks (GPT1 and GPT2) have very flexible multifunctional timer structures, which can be used for timing, event counting, pulse width measurement, etc.
- Each block has alternate input/output functions and specific interrupts associated to them
- Each timer of this module has an input pin assigned, which serves as the gate control or the count input. Moreover, T3 and T6 have an output pin associated for Output Toggle Latch
- Overflow/underflow signal of timer T6 is connected to GTM/eGTM input
- GTM/eGTM outputs are connected to trigger/gate input of core timer T3 and T4, count direction control input of core timer T3 and trigger input to capture value of timer T5



Application example
Timer incremental mode for brushless drives



Overview

- Mounted with an encoder, the motor delivers three signals (A,B,T0)
- Two of them (A, B) provide a square wave signal with a 90 degree phase shift
- The third one (T0) generates once per revolution a short pulse for synchronization

Advantages

- The exact position of the rotor position of a motor can be delivered to apply the right commutation pattern
- The timer of the GPT1 supply the exact position value to the application without additional software

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