SCR
Standby Controller

AURIX™ TC4xx Microcontroller

V1.0.0 2024-09

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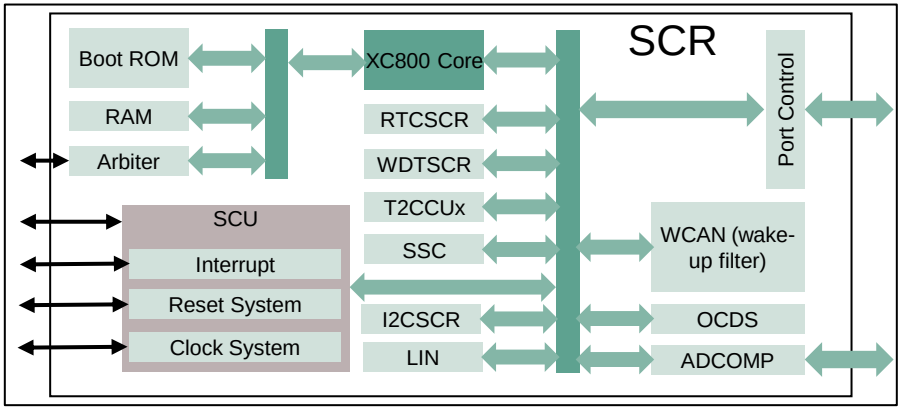
SCR
Standby Controller



Highlights

- The SCR is an 8-bit microcontroller that can continue to run during the standby mode
- It is based on the standard 8051 8-bit core
- The microcontroller has an embedded 32 KB XRAM for program code and data

Key Features

Two 16-bit T2CCU Timers

Real Time Clock (RTC)

Power Saving Modes

Customer Benefits

- Digital signal generation
- Periodic wake-up in standby mode
- Various power saving techniques can be implemented

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SCR
Two 16-bit T2CCU timers

- One of the features of the SCR is the two 16-bit T2CCUs, each containing a 16-bit timers and a 6-channel Capture/Compare Unit (CCU)
- The timers can work in either timer or counter operation:
  - 16-bit timer (with 16-bit auto-reload mode)
  - Selectable up or down counting
- Additionally, a 6-channel Capture/Compare Unit is included:
  - 16-bit resolution
  - Six compare channels
  - Four capture channels
- The T2CCU can be used for various digital signal generation and event capturing like pulse generation, pulse width modulation, pulse width measuring etc. Target applications include various automotive control as well as industrial applications (frequency generation, digital-to-analog conversion, process control etc.)

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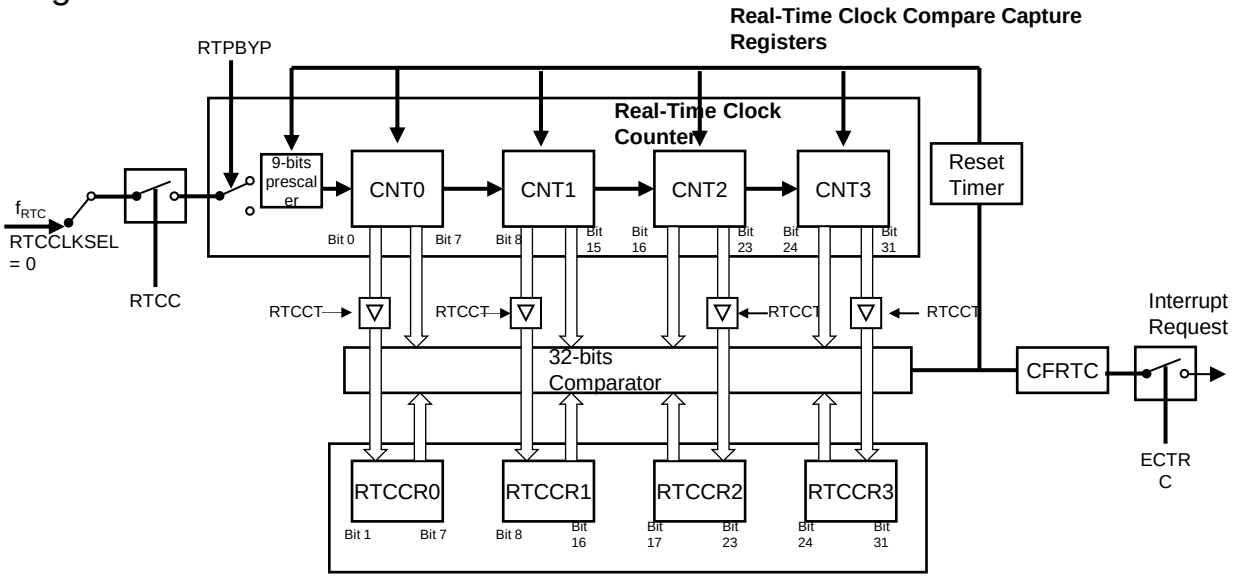
SCR
Real Time Clock (RTC)

- One of the SCR's peripherals is the Real Time Clock (RTC), which, once started, can work independently of the state of the rest of the microcontroller
- The Real Time Clock (RTC) with the on-chip oscillator supports the periodic wake-up in standby mode
- The periodic Wake-up Mode is using either:
  - the 70 kHz clock
  - the 100 MHz /DIV clock
  - XTAL3/4 oscillator clock forwarded by the Power Management System
  - Externally supplied clock on the SCR pin (P33.10)



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SCR
Power saving modes

- The different Power Saving Modes ensure a very flexible configuration, using either the idle mode or the clock gating control to each peripheral
- The switch between the STANDBY0 and STANDBY1 system modes can be done without the wake-up of the main SoC
- With only one silicon, two separate core domains are supported:
  - A “high performance” domain (TriCore™): this is needed for example, only when the engine is on
  - A “low power” domain (SCR):
    - It is permanently on
    - All features needed for supervising tasks are available
    - Wake-up of high-performance domain can be done only when needed (e.g. when the car is started)

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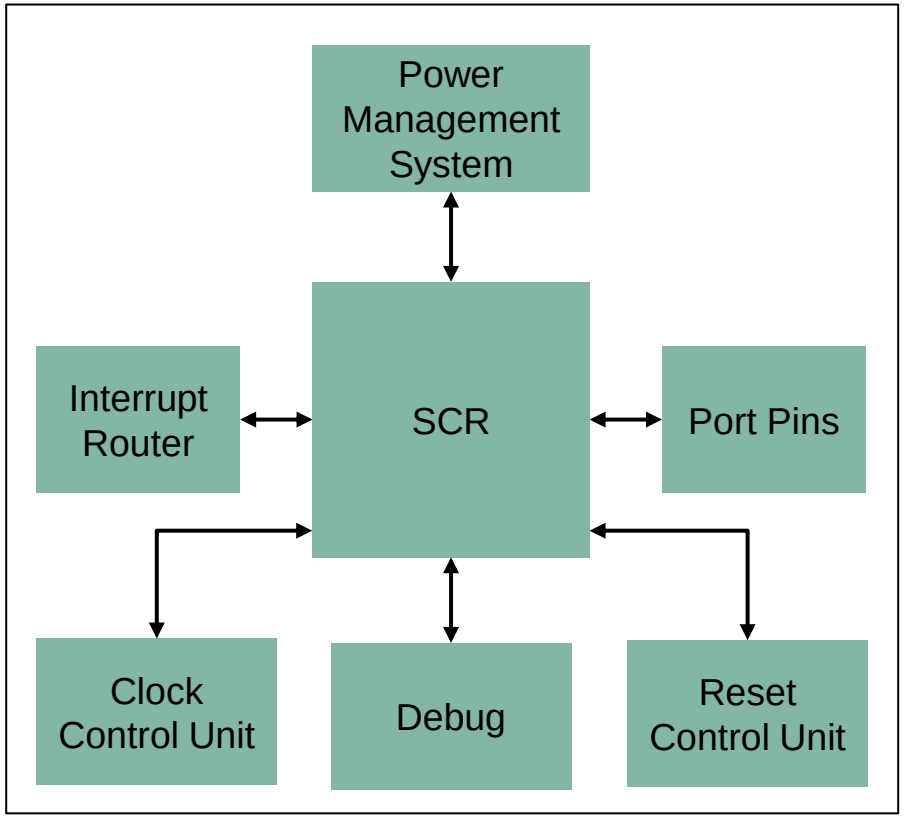
SCR
System integration

- The SCR is connected to multiple modules of the AURIX™ microcontroller:
  - Power Management System: it controls the changes between different power domains
  - Interrupt Router: it triggers different interrupt signals
  - Clock Control Unit: it selects the correct clock source
  - Reset Control Unit: it ensures that the SCR receives the request for reset
  - Debug: SCR has its own debug interface separately from the AURIX™, which allows parallel debugging of both TriCore™ and SCR
  - Port Pins: the timers contained in SCR can generate digital signals on these port pins



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Application example
RTC with GPIO read and TriCore™ wake-up

- The microcontroller shall perform periodic communication with external components through one of the available interfaces
- The system receives a communication request for the channel through a change in the logical state on one of the TX lines
- The system respond time for the communication shall not exceed 200 ms and the system current in this mode shall not exceed 7 mA, given the total budget of the microcontroller average current of 5 mA
- The standby mode together with the total amount of pins (the high-end devices have a total amount of 32 pins) fits all the requirements:
  - The periodic wake-up of the TriCore™ cluster in a minimal configuration can take place in order to acquire the necessary amount of signals
  - Even though the TriCore™ domain requires a relatively high current, the average current remains low since most of the time only the SCR with a minimum functionality remains active

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