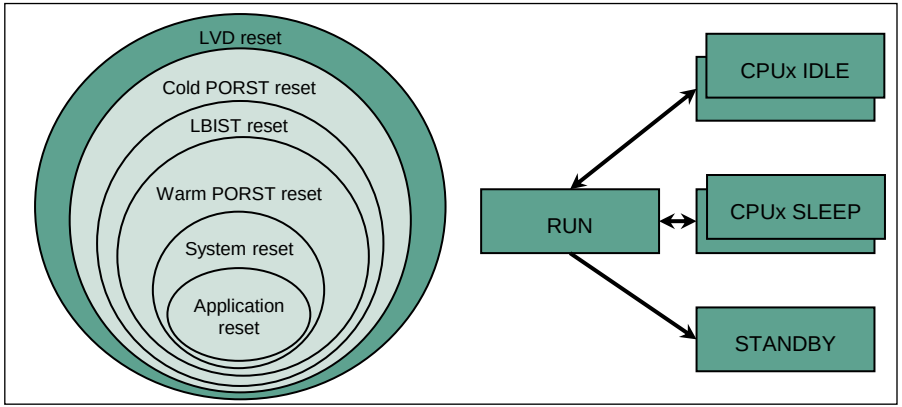
SMM
System Mode Management

AURIX™ TC4xx Microcontroller

V1.0.0 2024-09

Please read the Important Notice and Warnings at the end of this document

SMM
System Mode Management



Highlights

- Different power modes provide the possibility to save power consumption
- Resets are managed by SMM to make the intended modules and RAMs to switch back to reset state

Key Features

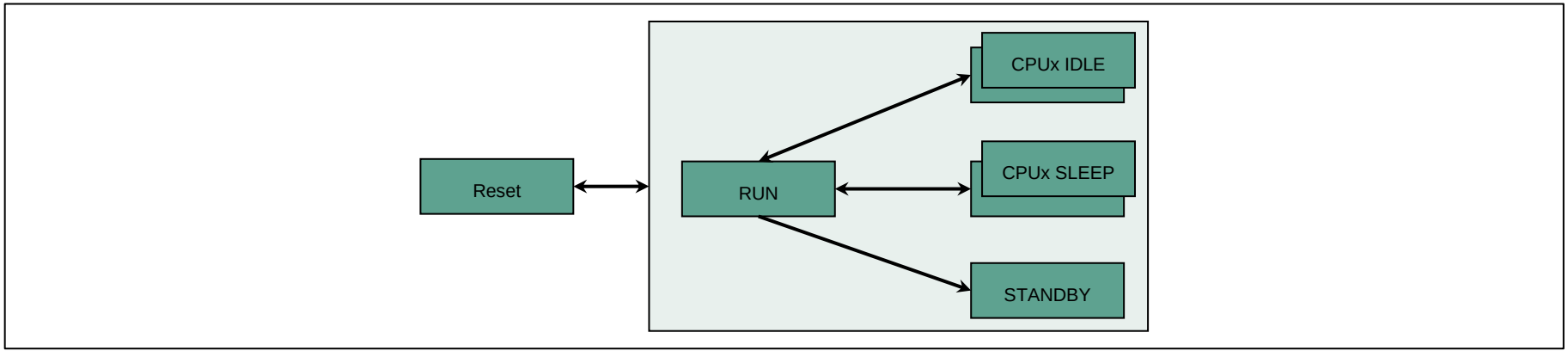
System modes: SMM supports the transaction among various system modes like reset state, RUN0/1 Mode and IDLE/SLEEP/STANDBY mode

Reset types: SMM manages various reset types like Cold or Warm Power-On Reset, Application Reset, System Reset, Module (Group) Reset etc.

Customer Benefits

- Various power modes supports flexible consumption use cases
- User may choose the most proper reset type to reset necessary modules and also to achieve the optimum reset time

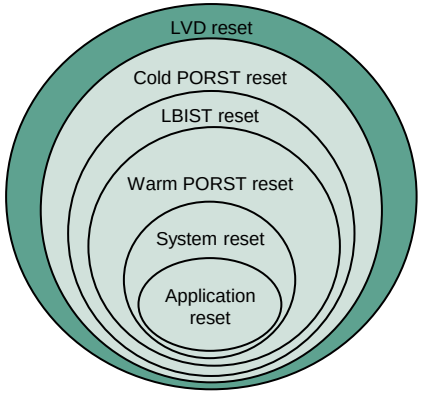
SMM
System Modes



› Supported system modes:

- RUN mode: at least one CPU is not in IDLE or SLEEP mode. CPU clock is active, and code is being executed
- IDLE mode: The CPU code execution is halted, and CPU clock is disabled in Idle state. The peripherals continue to remain active. CPU RAM memories are accessible to other bus masters and peripherals
- SLEEP mode: CPU code execution is halted, and CPU Idle state is entered. Peripherals are set into sleep state if so, configured in the respective CLCx.EDIS bit. Ports retain their earlier programmed state
- STANDBY mode: The Standby domain constituting the Standby RAM, the 8-bit standby controller, standby ports including pin wake-up logic remain actively supplied. The power to the rest of the chip is completely switched off. VDD supply rail is switched off

SMM
Reset Types

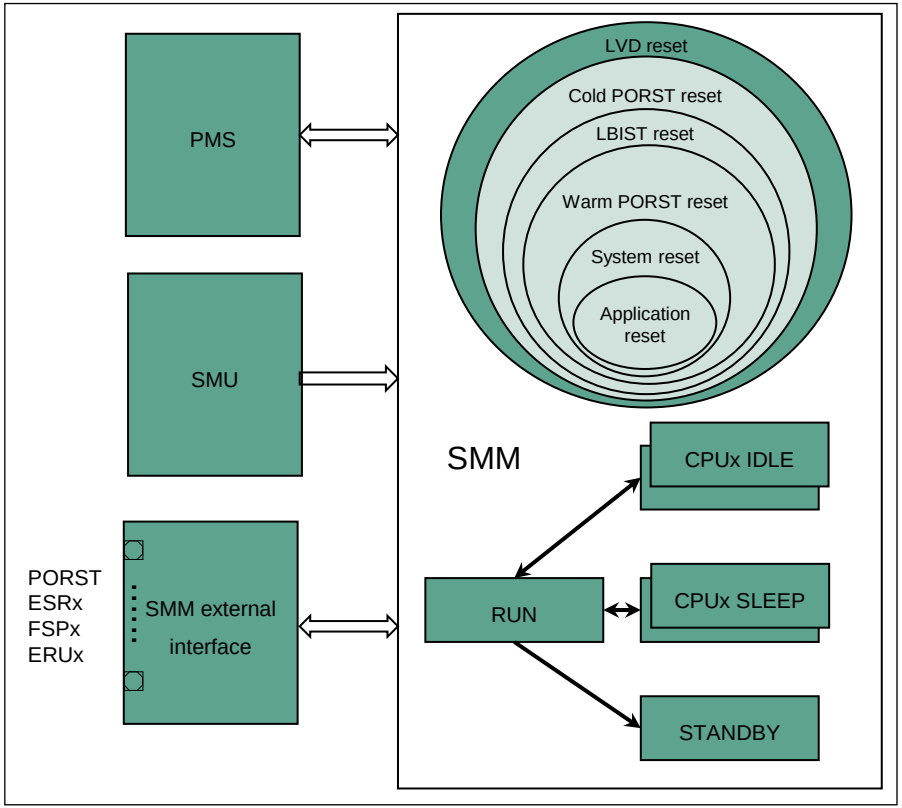


Effect of Reset on Device Functions

Module/Function	Low Voltage Detector Resets	Cold Power-on Reset	LBIST	Warm Power-on Reset	System Reset	Application Reset
PMS0, PMS1	X	Not affected	Not affected	Not affected	Not affected	Not affected
SCR	X	configurable	Not affected	configurable	Not affected	Not affected
PMS2, EVRC, Standby SMU	X	X	Not affected	Not affected	Not affected	Not affected
PORST pin	driven low	driven low	Not affected.	Not affected. Reset trigger	Not affected	Not affected

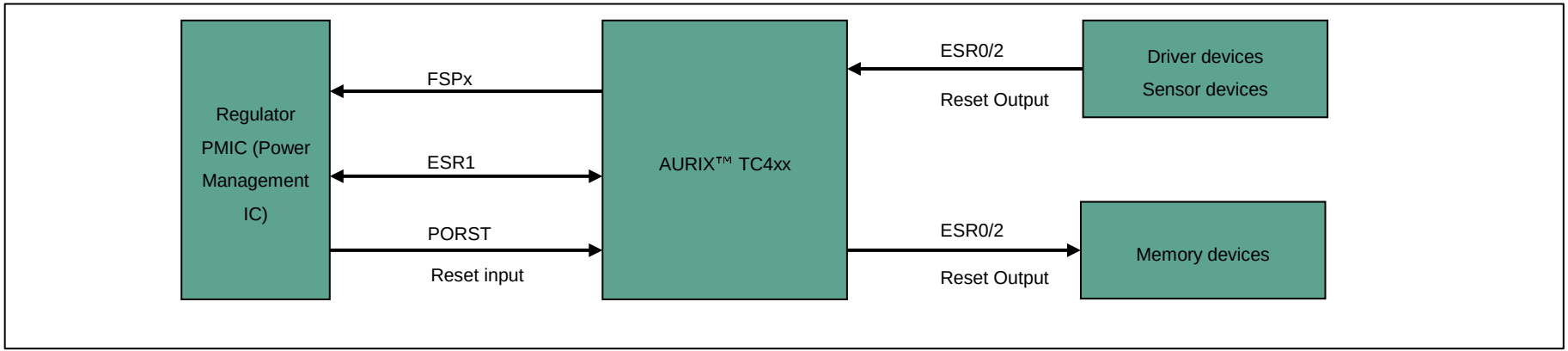
- Lower reset class is automatically done, when a higher reset class is triggered. For example, when user triggers a system reset, then application reset is automatically included too
- It is important to know which domains are reset, and which domains are not affected, by which reset class. Please refer to user manual table „Effect of Reset on Device Functions“
- Reset sources could be: under or over voltage events, ESRx pin assertion, PORST pin assertion, SMU (Safety and security alarm Management Unit) Alarm, software trigger, debugger trigger etc

SMM
System integration



- SMM manages power modes and reset, which affect the microcontroller overall
  - It has especially close interaction with PMS (Power Management System)
  - It receives reset triggers from PMS (voltage event), SMU and other reset sources etc.
  - It provides reset information for user evaluation e.g. which triggers have triggered reset, which is the highest-class trigger of the previous reset
  - In many applications SMM also interacts with user external reset controls e.g. through ESRx pins. ERUx (External Request Unit) can also be used to trigger reset
  - FSPx (Fault Signaling Protocol) pins can be reset output indication too

Application example
Reset Control



Overview

- In real applications, both AURIX™ and external user components, must be reset in a controlled manner
- The timing e.g. when a device should release its reset can be implemented with the support of SMM

Advantages

- AURIX™ is able to react on reset input, typically from power supply IC, external watchdog or any other peripheral. Reset type is configurable for user
- As main microcontroller, AURIX™ is responsible for external component reset timing (reset output). For example, some components need longer reset time, this can be achieved by using the ESRx configurable delay feature

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2024-09
Published by
Infineon Technologies AG
81726 Munich, Germany

Do you have a question about this document?
Email: erratum@infineon.com

Document reference
AURIX_3_ System Mode_Management

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie") .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.


Infineon