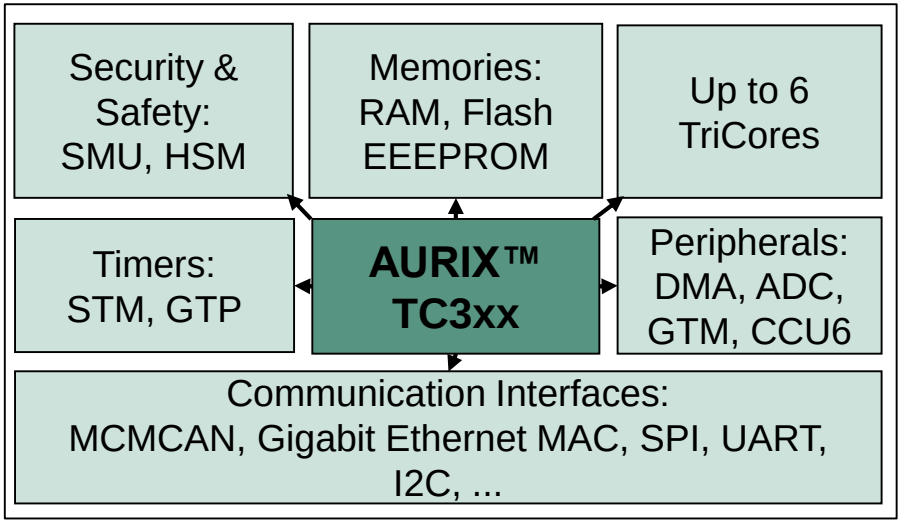
AURIX™

System Architecture

AURIX™ TC3xx Microcontroller Training
V1.0 2020-06

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

AURIX™
System Architecture



Highlights

- Multicore Microcontroller with embedded Flash
- TriCore™ (DSP processor) @300 MHz
- Up to 16 MB Flash, more than 6 MB RAM
- DMA, HW-FFT, ADC, Gigabit Ethernet MAC,...

Key Features

Embedded flash platform for real time applications

Up to 6 TriCore™ with DSP instructions

Rich peripheral set and large RAMs

Customer Benefits

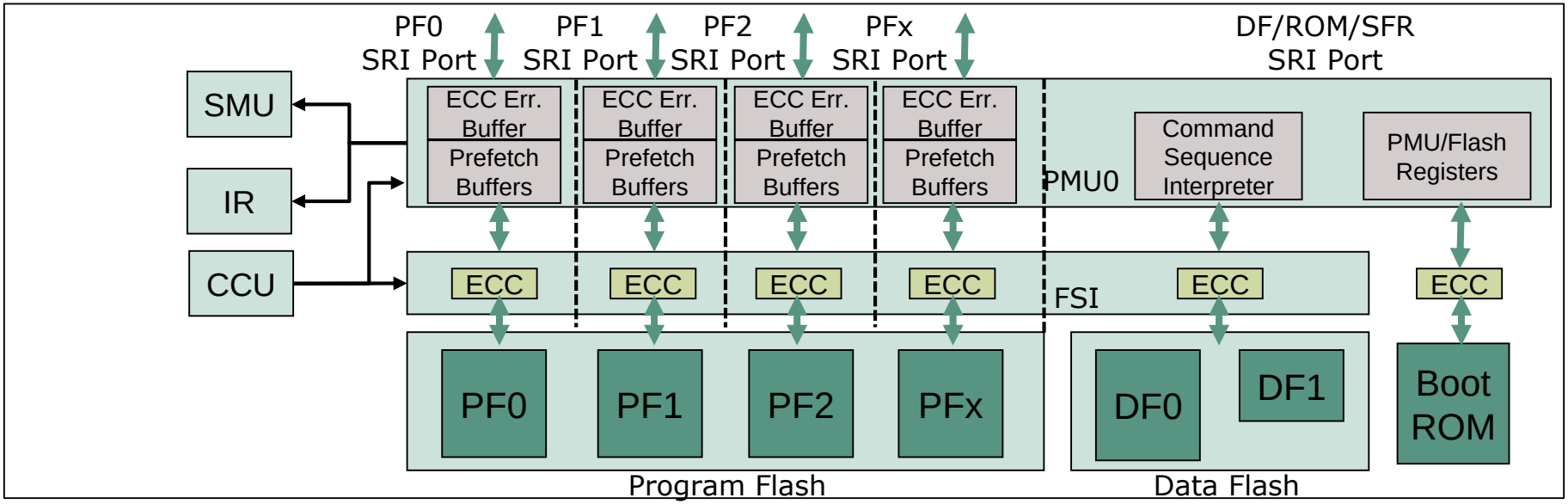
- Embedded flash allows compact design and fast code execution
- Enables heavy processing tasks like radar or signal processing applications
- Reduces the need for external components for cost competitive BOMs

Copyright © Infineon Technologies AG 2020. All rights reserved.

AURIX™
Embedded flash platform for real time applications

- All the flash memory is divided in banks (PF0-6 & DF0-1), which are concurrently readable.
- Each bank has it own Shared Resource Interconnect (SRI) ports, Error Correction Code (ECC) decoders and pre-fetch logic.
- In case of ECC errors, the Safety Management Unit (SMU) and the Interrupt Router (IR) can be configured to generate errors, respectively interrupts.
- This embedded flash platform offers a high performance code storage and flexible memory selection, controlled by safety mechanisms.

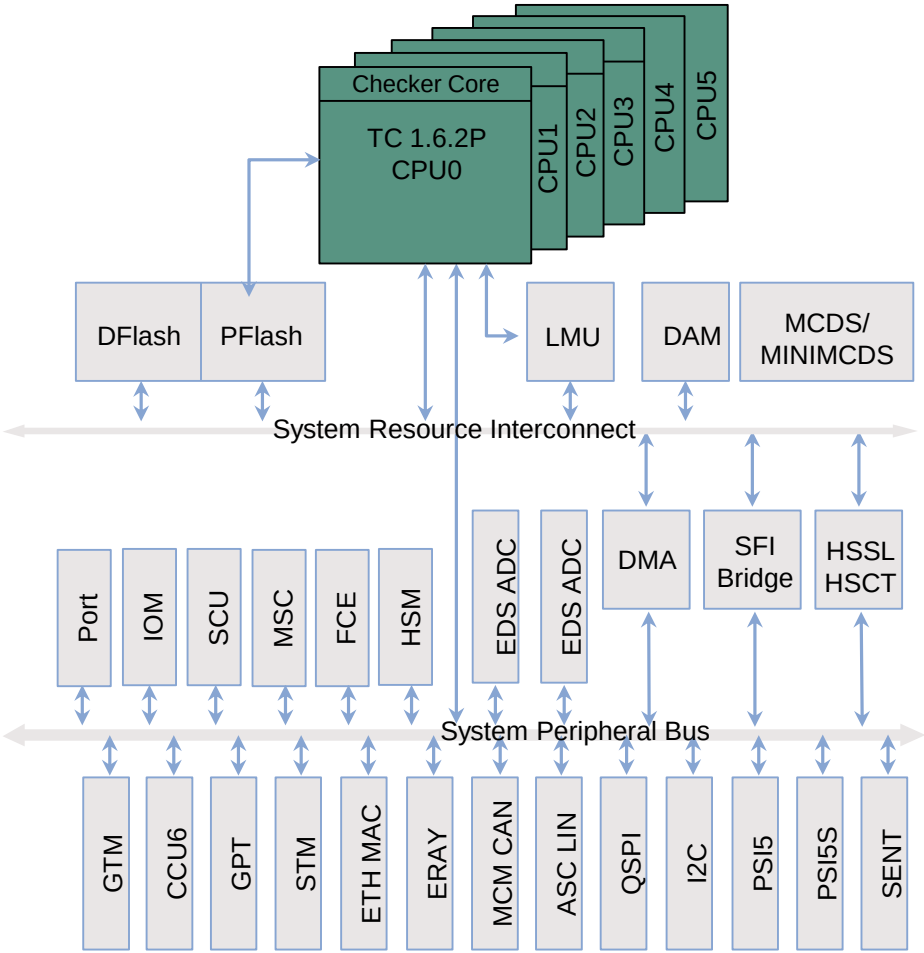
Note: This is the general description of the Flash memory structure on AURIX™ TC3xx. This depends on the device. Please refer to the according User Manual.



Copyright © Infineon Technologies AG 2020. All rights reserved.

AURIX™
Up to 6 TriCore™ with DSP instructions

- The TriCore™ architecture combines three powerful concepts:
  - Microcontroller
  - RISC processor
  - DSP (Digital Signal Processor)
- **TC 1.6.2P:**
  - High **performance** architecture
    - **Superscalar** Harvard
    - **6 pipeline stages** for up to 300 MHz
  - 2.3 DMIPS/MHz
  - Instruction and data cache
- **32bit Floating Point Unit in all CPUs:**
  - Single precision according to IEEE-754
  - 2 FLOPs per cycle (pipelined)



AURIX™ TC39x Block Diagram

Copyright © Infineon Technologies AG 2020. All rights reserved.

AURIX™
Rich peripheral set and large RAMs

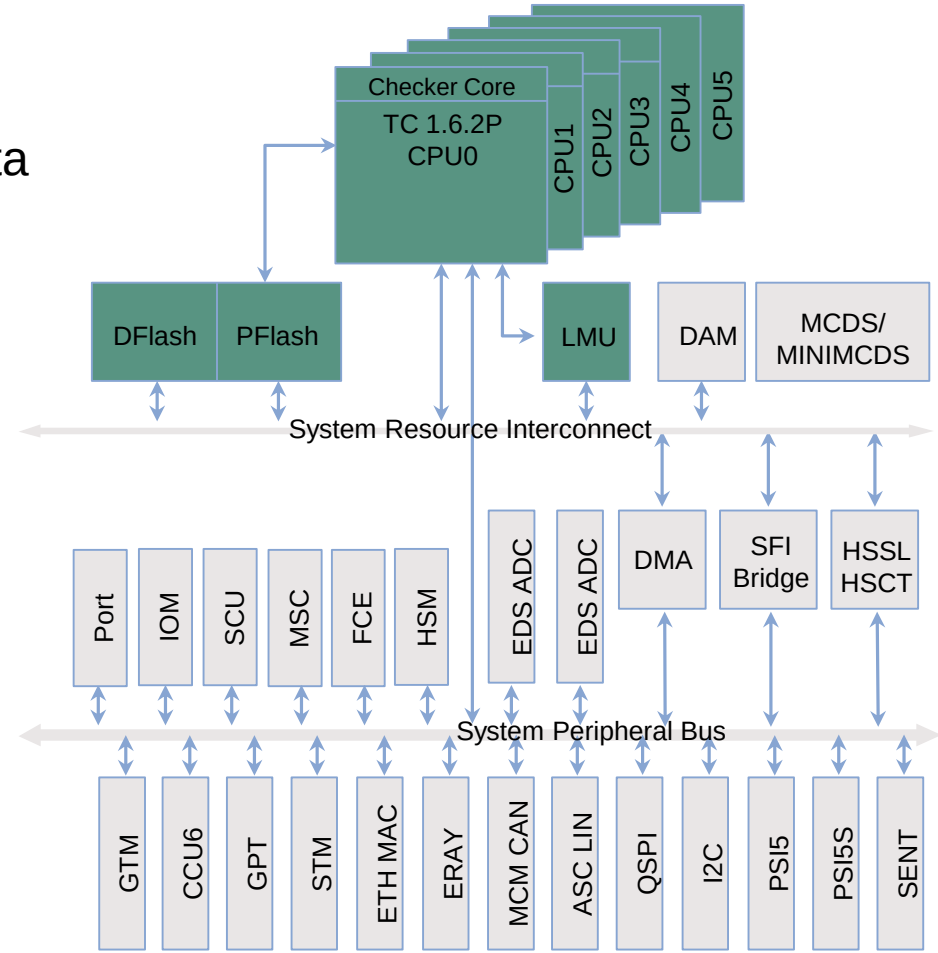
- **Peripherals:**
  - ADC: Analog-Digital Convertor – 12-bit up to 1 MSPS
  - GTM, GPT12 and CCU6: Signal Capture / Compare and PWM generation
  - FFT engine: Fourier Transform acceleration
  - STM: Timer Module
  - DMA: Direct Memory Access Module
  - Advanced On – Chip Debug System (OCDS)
- **Communication Interfaces:**
  - QSPI: Advanced SPI interface (Serial Peripheral Interface)
  - MCMCAN: CAN Interface
  - ASCLIN: Lin and UART
  - Gigabit Ethernet MAC: Ethernet 1000 Mbit/s interface
  - I2C: Inter-Integrated Circuit Bus
  - EBU: External Bus Unit (32-bit Data, 24-bit Address)
- **On-Chip Memories:**
  - More than 6 MB integrated RAM including CPUs tightly coupled Scratch-Pad RAM
  - Up to 16 MB integrated Flash memory with EEPROM Emulation

Copyright © Infineon Technologies AG 2020. All rights reserved.

AURIX™
Rich Peripheral set and large RAMs

AURIX™ Multi-CPU architecture contains:

- Distributed Scratch-Pad RAMs for data (DSPR) and program (PSPR)
  - Can be accessed by all CPUs
- CPUs execute code from cached PFlash modules

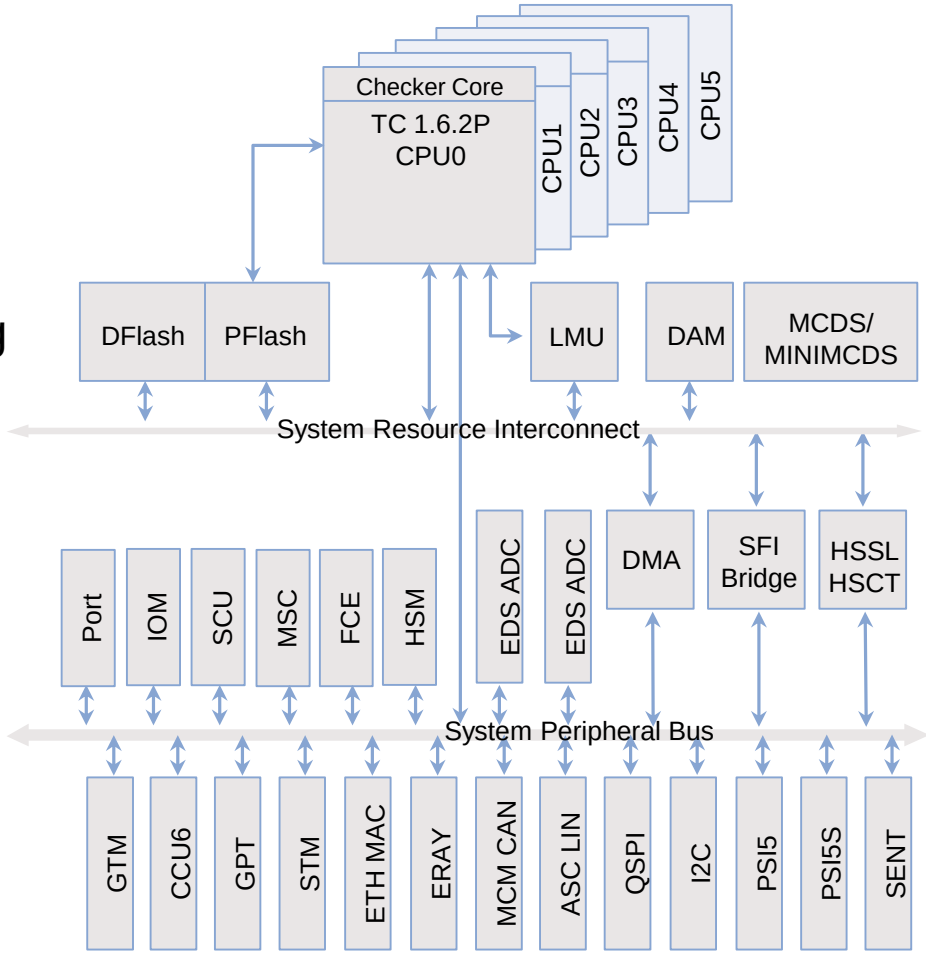


AURIX™ TC39x Block Diagram

Copyright © Infineon Technologies AG 2020. All rights reserved.

AURIX™
System integration

- AURIX™ TC3xx combines three powerful technologies within one silicon die, improving power consumption, speed and reducing the costs for embedded applications:
  - Reduced Instruction Set Computing (RISC) processor architecture
  - Digital Signal Processing (DSP) operations and addressing modes
  - On-chip memories and peripherals
- AURIX™ TC3xx devices are designed to meet the needs of embedded control systems applications, where real-time responsiveness, computational power and data bandwidth are key design elements



AURIX™ TC39x Block Diagram

Copyright © Infineon Technologies AG 2020. All rights reserved.

Application Example
Automotive Industry

Overview

Car systems like airbag and engine management need to operate in a safe and secure way:

- Safe: Airbag must not trigger under regular driving conditions
- Secure: Unauthorized persons must not be able to hack the car's systems

Advantages

Beside AURIX™ TC3xx versatile set of on-chip peripherals connected to TriCore™ CPUs, the AURIX™ family also offers safety and security modules to deal with critical embedded applications.

Copyright © Infineon Technologies AG 2020. All rights reserved.

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

Edition 2020-06
Published by
Infineon Technologies AG
81726 Munich, Germany

© 2020 Infineon Technologies AG.
All Rights Reserved.

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

Document reference
AURIX_Training_2_System_Architecture

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.