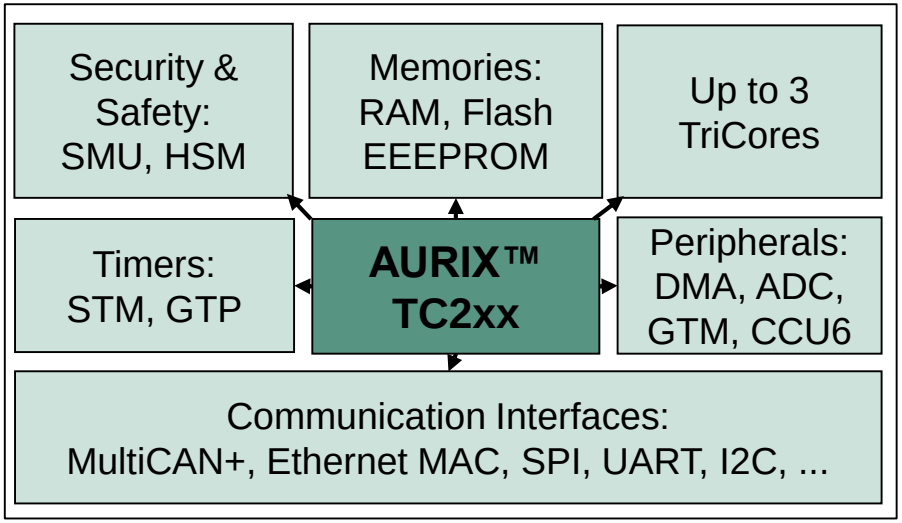
AURIX™

System Architecture

AURIX™ Microcontroller Training
V1.0 2019-03

AURIX™
System Architecture



Highlights

- Multicore Microcontroller with embedded Flash
- TriCore™ (DSP processor) @300 MHz
- Up to 8 MB Flash, more than 2 MB RAM
- DMA, HW-FFT, ADC, Ethernet MAC,...

Key Features

Embedded flash platform for real time applications

Up to 3 TriCore™ with DSP instructions

Rich peripheral set and large RAMs

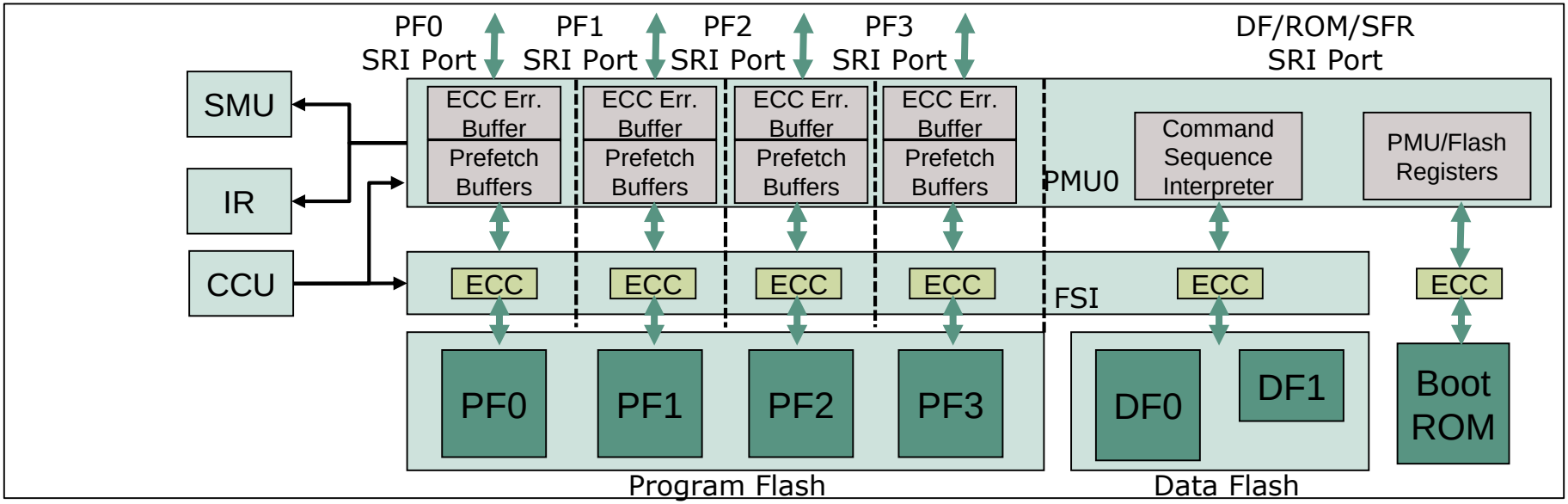
Customer Benefits

- 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

AURIX™
Embedded flash platform for real time applications

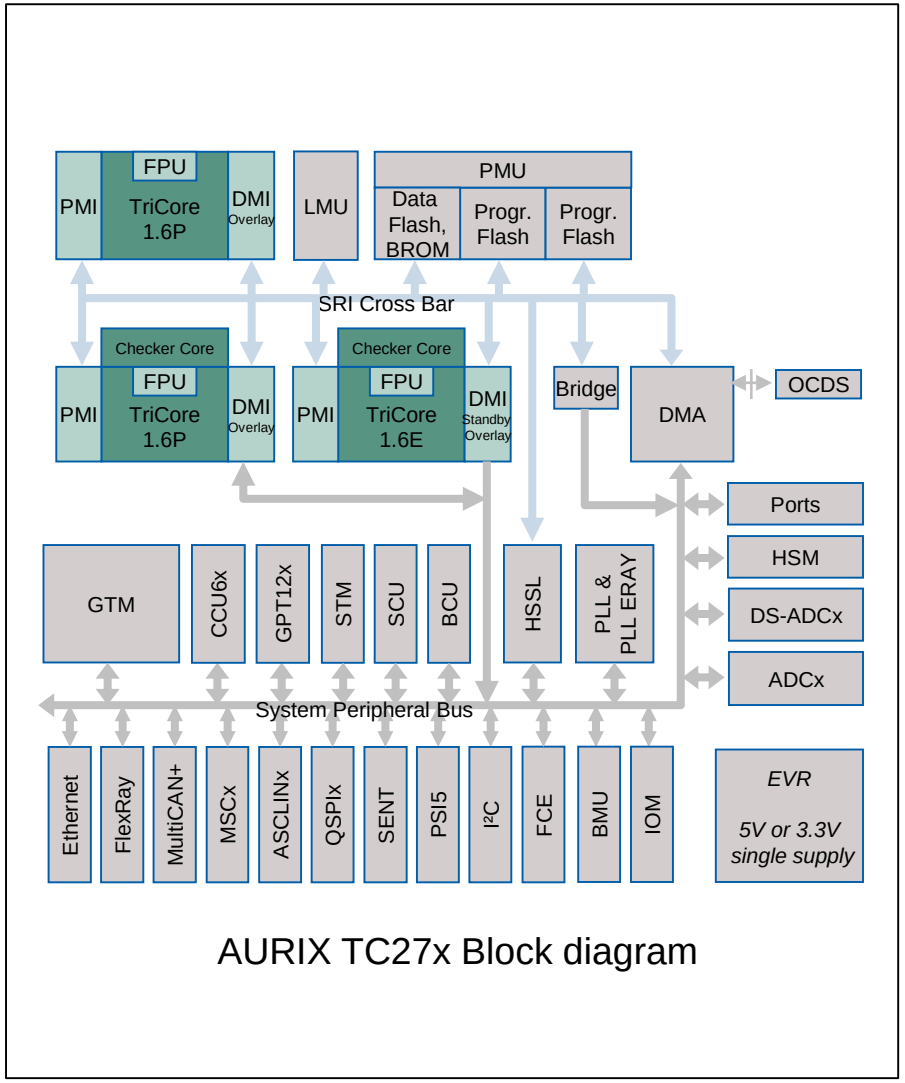
- All the flash memory is divided in banks (PF0-3 & DF0-1), which are concurrently readable.
- Each bank has it own Shared Resource Interconnect (SRI) ports, Error Correction Code (ECC) decoders and pre-fetch logic.
- In case of ECC errors, the Safety Management Unit (SMU) and the Interrupt Router (IR) 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 Flash memory structure of AURIX™ TC29x. For all the other devices, consult the User Manual.



AURIX™
Up to 3 TriCore™ with DSP instructions

- The TriCore™ architecture combines three powerful concepts:
  - Microcontroller
  - RISC processor
  - DSP (Digital Signal Processor)
- **TC 1.6Efficiency (TC 1.6E):**
  - High **efficiency / low power** architecture
    - **Scalar** Harvard
    - **4 pipeline stages** for up to 200 MHz
  - Identical instruction set as TC1.6P
  - 1.4 DMIPS/MHz
  - Instruction cache
- **TC 1.6Performance (TC 1.6P):**
  - High **performance** architecture
    - **Superscalar** Harvard
    - **6 pipeline stages** for up to 300 MHz
  - Identical instruction set as TC1.6E
  - 1.6 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 TC27x Block diagram

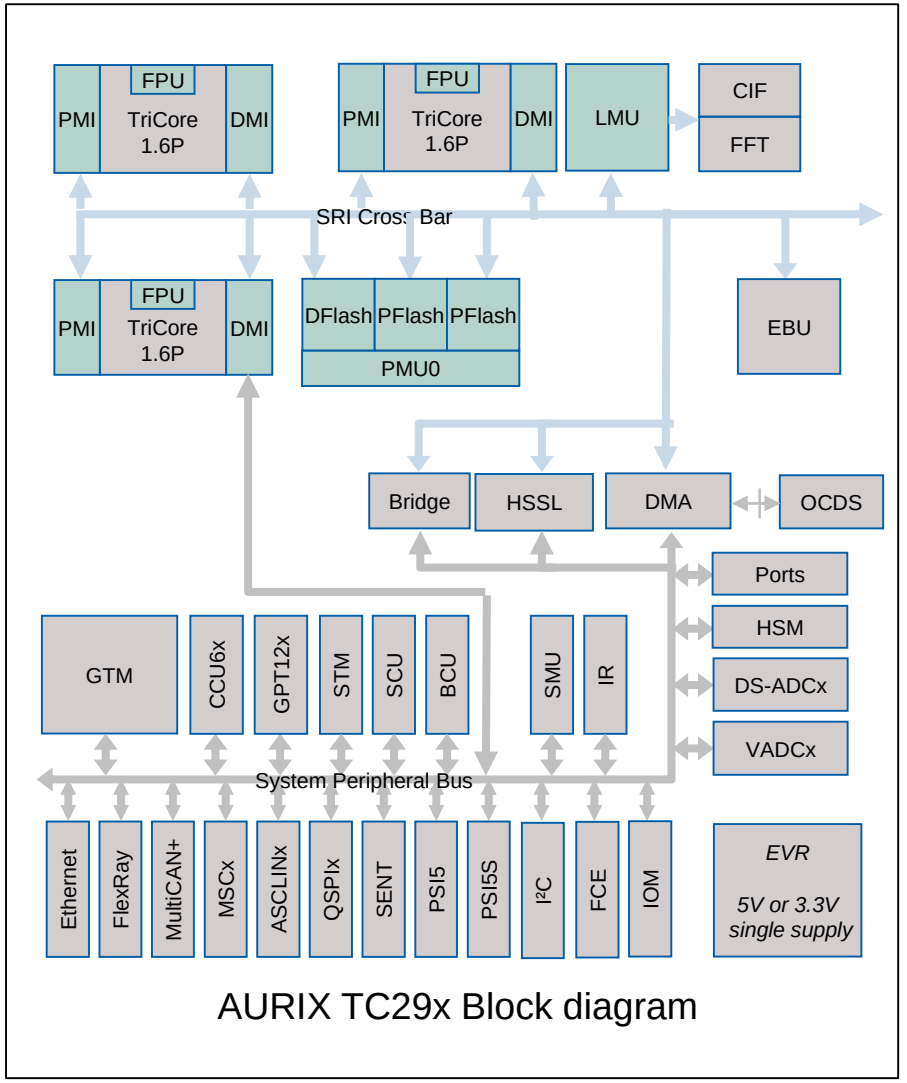
AURIX™
Rich peripheral set and large RAMs

- **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)
  - CAN: Controller Area Network
  - Ethernet MAC: Ethernet 100 Mbit/s interface
  - I2C: Inter-Integrated Circuit Bus
  - EBU: External Bus Unit (32-bit Data, 24-bit Address)
- **On-Chip Memories:**
  - More than 2 MB integrated RAM including CPUs tightly coupled Scratch-Pad RAM
  - Up to 8 MB integrated Flash memory with EEPROM Emulation

AURIX™
Rich Peripheral set and large RAMs

AURIX™ Multi-CPU architecture contains:

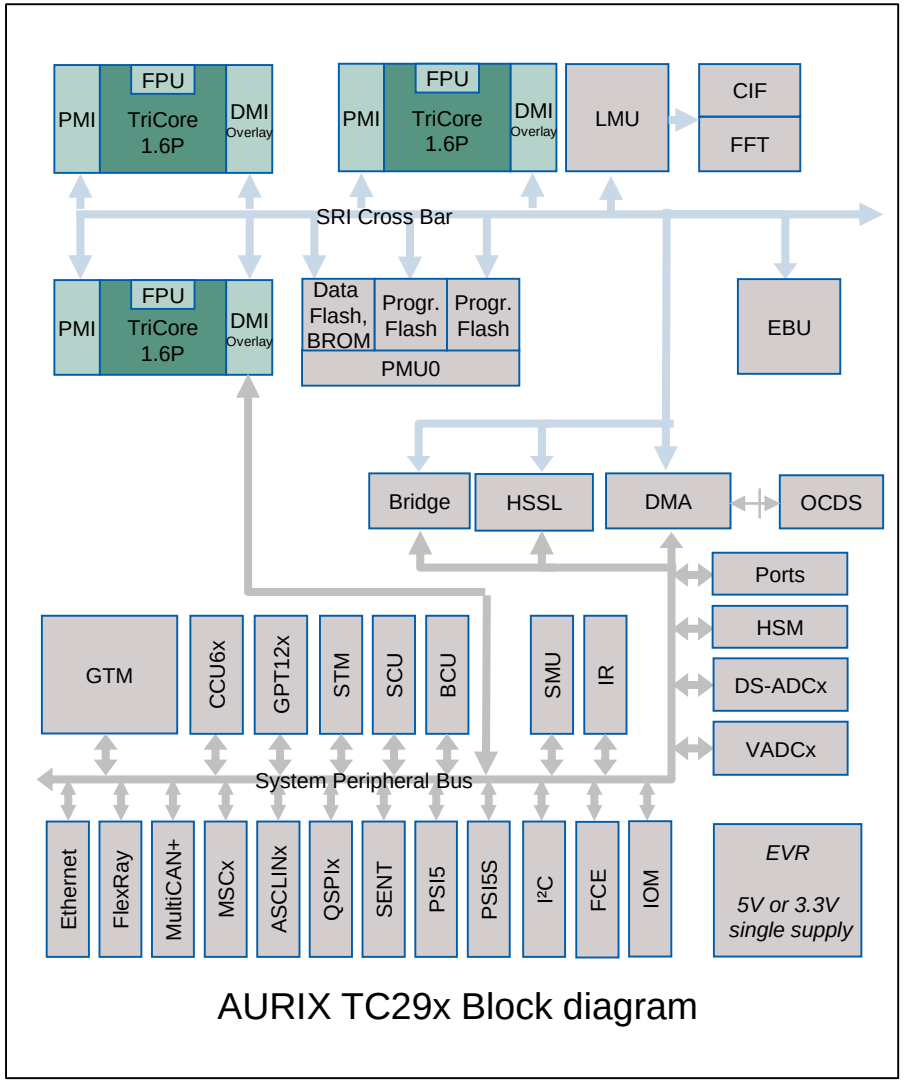
- Distributed Scratch-Pad RAMs for data (DSPR) and program (PSPR)
  - Can be accessed by all CPUs
- CPUs execute code from cached PFlash modules



AURIX TC29x Block diagram

AURIX™
System integration

- AURIX™ TC2xx 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™ TC2xx 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 TC29x Block diagram

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™ TC2xx 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.

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