SAFETY
Safety Concept
SAFETY Safety Concept

AURIX™ was developed as a Safety Element out of Context (SEooC) fulfilling the applicable objectives of ISO 26262 up to ASIL D

ISO 26262 part of Infineon’s standardized development process

Key Features
- ISO 26262 standardized development process
- Hardware safety mechanisms
- Safety documentation

Customer Benefits
- Support ISO 26262:2011 compliant applications development
- Supports protection against random faults as described in safety manual
- Accelerates the development of safety critical applications
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ISO 26262 standardized development process

The scope of the SEooC comprises:

› The AURIX™ microcontroller hardware component

› Assumptions of use (AoU) related to the software elements that
  - support the integration to the AURIX microcontroller hardware components in a safety-related application
  - support the single point fault metric up to ASIL D for software applications target to utilize non-lockstep CPU core.

› Assumptions of use related to the hardware environment including assumed external safety mechanisms

› Assumptions of use related to the software environment

› Assumptions of use related to the use of the safety mechanisms provided by the SEooC

All of the above support the development of safety critical applications which are ISO 26262:2011 compliant.
SAFETY
Hardware safety mechanisms

Safe computing:
- Delayed Lockstep CPU with diverse layout

Safe data and code storage:
- Error Detection Codes ECC for RAM and Flash memories
- Memory Protection Unit MPU for code and data

Safe intra chip communication:
- SRI Cross Bar: End-to-End monitoring of data and address failures using ECC

Safe infrastructure:
- Clock frequency range monitors
- Power supply range monitoring
- Internal watchdog timers

Support for coexistence of elements:
- CPU Memory Protection
- Bus Memory Protection
- Register Access Protection

Safety management unit:
- Configurable error handling

I/O Monitor:
- Flexible logic analyzer to monitor or compare digital signals

AURIX™ TC39x
SAFETY
Safety documentation

System/Software Engineers

› Which safety mechanisms are available in AURIX™ TC3xx hardware and how to use them?
› Which external safety mechanisms are required?
› Which safety mechanism shall be implement at the application-level?
› How to monitor application dependent parts and which ones are independent?

Functional Safety Managers/Engineers/QM

› Computation of project specific hardware architectural metrics
› Are all the required safety measures correctly implemented?
› Assessment of AURIX™ compliance to the objective of ISO26262
Safety as a concept is an integrated part of the AURIX™, nonetheless there are aspects that are application dependent such as:

- Ensuring redundancy over the analog and digital Inputs / Outputs and over communication protocols
- Configuration of individual modules (e.g. peripherals) in a safe manner
- Implementation/Fulfillment of AoU according to the Safety Manual as applicable for respective application
Application example
External safety mechanisms

Overview

› AURIX™ can manage different fail scenarios such as detecting under/over voltage of the external supply, dependent failures which cause the diagnostic system to fail too

Advantages

› For all these fail scenarios, recommended reactions can be implemented, such as bringing the system in its safe state
› Well defined reaction systems ensure that the faulty behavior of external components will not produce malfunctions

Note: the grey blocks represent functions to be allocated to external devices, not hardware components.
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