Document Name	Requirements of DIO Driver (SRS)
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1- Scope of document

This document specifies requirements on the module DIO Driver.

1.1 - Constraints

First scope for specification of requirements on basic software modules are systems which are not safety relevant. For this reason, safety requirements are assigned to medium priority.

2- Requirement structure

Each module specific chapter contains a short functional description of the Basic Software Module. Requirements of the same kind within each chapter are grouped under the following headlines (where applicable)

2.1 Functional Requirements:

- Configuration (which elements of the module need to be configurable)
- Initialization
- Normal Operation
- Shutdown Operation
- Fault Operation

2.2 *Non-Functional Requirements:*

- Timing Requirements
- Resource Usage
- Usability
- Output for other WPs

3- Acronyms and abbreviations

Acronyms and abbreviations	Description
DIO channel	Represents a single general-purpose digital input/output pin
DIO Port	Represents several DIO channels that are grouped by hardware (typically controlled by one hardware register). Example: Port A (8 bit)
STD-High	Represent the Bit Value High = 1
STD-Low	Represent the Bit Value Low = 0
Physical Level (Input)	Two states possible: LOW/HIGH. A bit value '0' represents a LOW, a bit value '1' represents a HIGH.
Physical Level (Output)	Two states possible: LOW/HIGH. A bit value '0' represents a LOW, a bit value '1' represents a HIGH.
U8	Unsigned Character Data Type of size (8-Bits)

4- Functional Overview

The DIO driver provides port and channel based read and write access to the internal general purpose I/O ports. The read and write behavior is unbuffered. The basic behavior of this driver is synchronous.

Expression	*Explanation*
DIO Channel	Represents a single general-purpose digital input/output pin
DIO Port	Represents multiple DIO channels that are grouped by hardware and accessible synchronously (typically controlled by one hardware register). Example: Port A (8 bit)

5- Functional Specification

5.1- Functional Requirements

5.1.1- Configuration and Initialization

Symbolic names shall be configured

Type	Valid
Description	The DIO driver shall allow the static configuration of the following symbolic names: • DIO channel names • DIO port names
Rationale	Provide human readable symbolic names for DIO channels
Use Case	None
Dependencies	None

5.1.1- Normal operation

Function Name	MCAL_DIO_u8_SetPortDirection
Description	The DIO Driver shall provide a service for setting the direction of a DIO Port by writing data word to the assigned port (Input/Output), without changing physical level. (Ex. DDRA)
Rationale	Basic functionality
Dependencies	General write behavior
Use Case	Write access to an entire DIO port

Function Name	MCAL_DIO_u8_SetPinDirection
Description	The DIO Driver shall provide a service for setting the direction of a single DIO channel by writing the value to the assigned pin (Input/Output) , without changing physical level(High/Low).
Rationale	Efficient handling of single DIO channels
Dependencies	General write behavior using data shift
Use Case	Write access to a particular DIO channel (port pin)

Function Name	MCAL_DIO_u8_SetPortValue
Description	The DIO Driver shall provide a service for setting the value of a DIO Port by writing data word to the assigned port by changing physical level (High / Low). (Ex. PORTA)
Rationale	Basic functionality
Dependencies	General write behavior
Use Case	Write access to an entire DIO port

Function Name	MCAL_DIO_u8_SetPinValue
Description	The DIO Driver shall provide a service for setting the value of a single DIO channel by writing the data to the assigned pin by changing physical level (High / Low).
Rationale	Efficient handling of single DIO channels
Dependencies	General write behavior using data shift
Use Case	Write access to a particular DIO channel (port pin)

Function Name	MCAL_DIO_u8_GetPinValue
Description	The DIO Driver shall provide a service for reading one bit value of an assigned DIO channel (specific port pin). The operation shall be unbuffered. There shall be no influence to the output functionality of the port.
Rationale	Basic functionality
Dependencies	General read/write behavior
Use Case	Read access to an entire DIO port

Function Name	MCAL_DIO_u8_TogglePinValue
Description	The DIO Driver shall provide a service to flip (change state from 1 to 0 or from 0 to 1) one bit of an assigned DIO channel (specific port pin)
Rationale	Write access to a particular DIO channel using shift data.
Dependencies	General read/write behavior
Use Case	Write access to an entire DIO port

5.2 Non-Functional Requirements

Type	Valid
Description	All re-entrant functions of the DIO Driver shall perform the following access actions in an atomic way • DIO ports • DIO channels
rationale	Avoid data integrity problems within concurrent access of DIO Driver API functions
Use Case	A specific microcontroller (or a specific compiler) does not provide atomic access to single port pins. For that reason, the implementation has to use read-modify-write operations on the whole port. Concurrent access to pins of the same port will lead to data integrity problems if concurrent access is not blocked
Dependencies	None
Supporting Material	None