# AUTOSAR IoHwAb User Manual

| Document Change History | | | |
|---|---|---|---|
| Date<br>(YYYY-MM-DD) | Ver. | Editor | Content (before revision -> after revision) |
| 2020-12-04 | 1.0.0.0 | Yangjin Kim | • Initial Version |
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|---|---|---|---|
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| 2023-08-18 | 1.6.2.0 | KhaLN1 | • Update module Module Version |

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|---|---|---|---|
| | | | • Update Change Log |
| 2023-09-07 | 1.6.3.0 | KhaLN1 | • Update module Module Version<br>• Update Change Log |
| 2023-12-08 | 1.6.4.0 | Yongeun Lee | • Update module Module Version<br>• Update Change Log |
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Table of Contents

# 1. Overview

It is written based on AUTOSAR standard SRS / SWS. If more detailed functional explanation is needed when using the module, see the Reference Manual. The interpretation of setting related category is as follows:

- Changeable (C): Items that can be set by the user
- Fixed (F): Items that cannot be changed by the user.
- Not Supported (N): Deprecated item



# 2. Reference

| Sl. No. | Title | Version |
|---|---|---|
| 1 | AUTOSAR_SWS_IOHardwareAbstraction.pdf | 4.4.0 |

Acronyms and abbreviations

| *Acronym:* | *Description:* |
|---|---|
| N_OK | Not OK |
| PossibleErrors | PossibleErrors means the ApplicationErrors as defined in meta model. |
| Application Layer | The Application Layer is placed above the RTE. Within the Application Layer the AUTOSAR Software-Components are placed. |

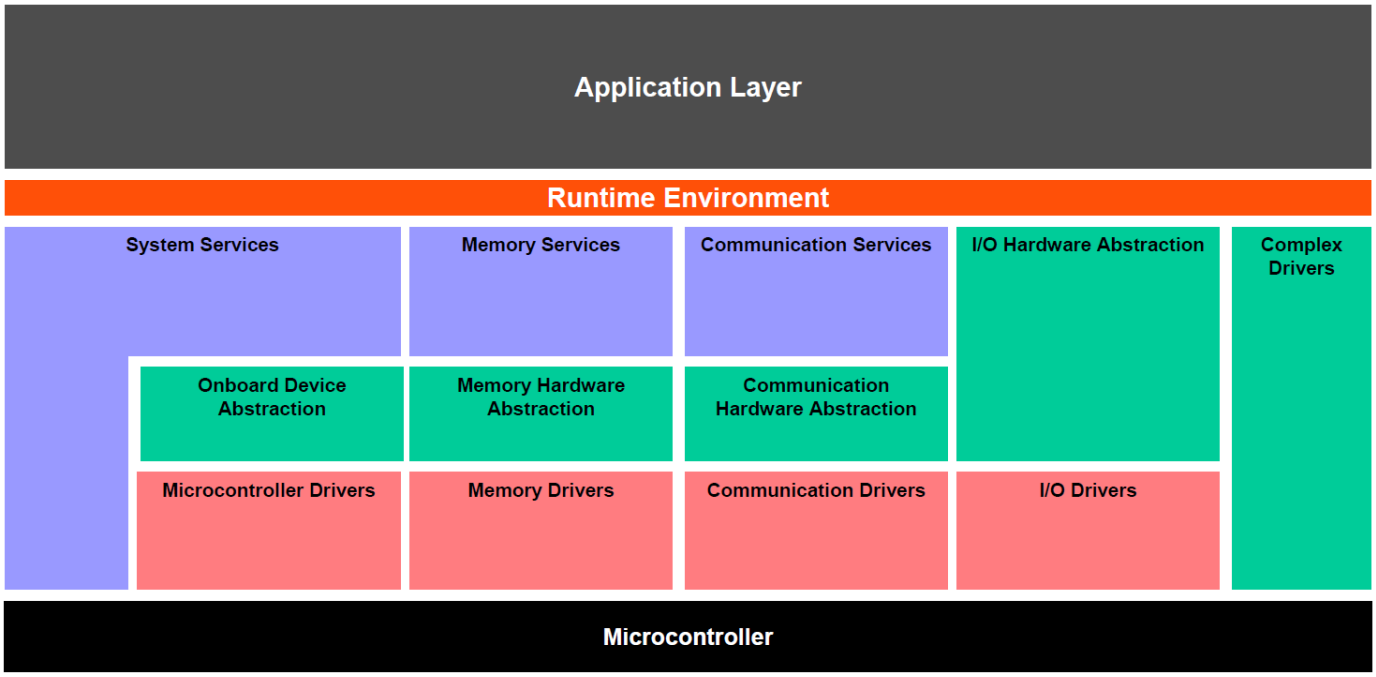
| *Abbreviation:* | *Description:* |
|---|---|
| API | Application Programming Interface |
| AUTOSAR | AUTomotive Open System ARchitecture |

| | |
|---|---|
| BSW | Basic SoftWare |
| DET/Det | Development Error Tracer |
| IoHwAb | Input/Output Hardware Abstraction |
| ECU | Electronic Contron Unit |
| SRS | Software Requirements Specification |
| SWS | SoftWare Specification |
| SID | Service Id |
| SW-C | SoftWare Component |

# 3. AUTOSAR System

## 3.1 Overview of Software Layers

The Layered Architecture of the AUTOSAR platform is as follows. The AUTOSAR platform can be divided into Service Layer, ECU Abstraction Layer, Complex Device Drivers, and Microcontroller Abstraction Layer.




## 3.2 AUTOSAR I/O Hardware Abstraction

The IO Hardware Abstraction module abstracts from the signal path of the ECU hardware (Layout, Microcontroller Pins, Microcontroller external devices like IO ASIC). It provides a signal based interface to the upper software layer. It performs static abstraction and inversion (if needed) of values according to their physical representation at the inputs/outputs of the ECU hardware (compensation of static influences caused within the path between ECU IO and Microcontroller pin, e.g. voltage divider, hardware inversion).

# 4. Limitations and Deviations

## 4.1 Limitations

1) Only Pre-Compile is supported

2) Ocu is not supported.

3) API IsInput and IsOutput (IoHwAb_If_DigDir) return always false if the user does not set PortPinDirection to PORT_PIN_IN or PORT_PIN_OUT.

## 4.2 Deviations

None

# 5. Configuration Guide

The IoHwAb setting of the AUTOSAR platform distributed by Hyundai Auto is a setting reflecting Hyundai Auto Policy's policy. Therefore, you should consult with Hyundai Auto.

## 5.1 IoHwAb

### 5.1.1 IoHwAb General Container

| Parameter Name | Value | Category |
|---|---|---|
| Dev Error Detect | true | F |
| Version Info Api | true | F |
| Mcal Vendor Version | Vendor Mcu Mcal dependent | F |

#### 5.1.1.1 IoHwAbPortPinCh

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Polarity | HighActive / LowActive | C |
| Hw Dio Ch Ref | User Defined | C |
| Hw Port Pin Ref | User Defined | C |

#### 5.1.1.2 IoHwAbAdcGroup

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Hw Adc Group Ref | User Defined | C |

#### 5.1.1.3 IoHwAbAdcAllGroups

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Hw Adc All Group Ref | Mcu Adc Hw Unit dependent | C |

#### 5.1.1.4 IoHwAbAdcGroupInAll

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Hw Adc Group Ref | User Defined | C |

#### 5.1.1.5 IoHwAbMux

#### 5.1.1.6 IoHwAbMC33972

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Spi Ch Ref | User Defined | C |
| Spi Seq Ref | User Defined | C |
| Spi Ext Device | User Defined | C |
| Spi Cs GPIO | User Defined | C |
| Ext Int Ch Ref | User Defined | C |
| Callback Via Rte | User Defined | C |
| Input Scan Period In Lp | User Defined | C |

#### 5.1.1.7 IoHwAbMC33972Pin

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Pin Group | SP / SG | C |
| Pin Bit Carrier | Pin Number(SP:0~7, SG:0~13) | C |
| Polarity | SG LowActive Only | C |
| Wake Up In Lp | User Defined | C |
| Wetting Current Timer | User Defined | C |
| Wetting Current Reg | User Defined | C |

#### 5.1.1.8 IoHwAbDemux

### 5.1.1.9 IoHwAbL9826

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Spi Ch Ref | User Defined | C |
| Spi Seq Ref | User Defined | C |
| Spi Ext Device | User Defined | C |
| Spi Cs GPIO | User Defined | C |
| Reset Ch Ref | User Defined | C |

### 5.1.1.10 IoHwAbL9826Pin

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Pin Bit Carrier | Pin Number(0~7) | C |
| Parallel Mode | User Defined | C |

### 5.1.1.11 IoHwAbL99MC6

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Spi Ch Ref | User Defined | C |
| Spi Seq Ref | User Defined | C |
| Spi Ext Device | User Defined | C |
| Spi Cs GPIO | User Defined | C |
| Charge Pump Control | User Defined | C |

### 5.1.1.12 IoHwAbL99MC6Pin

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Pin Bit Carrier | Pin Number(0~5) | C |
| Over Current Recovery | User Defined | C |

### 5.1.1.13 IoHwAbTLE7240SL

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Spi Ch Ref | User Defined | C |
| Spi Seq Ref | User Defined | C |
| Spi Ext Device | User Defined | C |
| Spi Cs GPIO | User Defined | C |
| Charge Pump Control | User Defined | C |

### 5.1.1.14 IoHwAbLTLE7240SLPin

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Pin Bit Carrier | Pin Number(0~7) | C |
| Input Mode | User Defined | C |

### 5.1.1.15 IoHwAbPrefixConfig

| Parameter Name | Value | Category |
|---|---|---|
| IoHwAbCustomPortPinPrefix | true / false | C |
| IoHwAbPortPinPrefix | User Defined | C |
| IoHwAbCustomSpiSequencePrefix | true / false | C |
| IoHwAbSpiSequencePrefix | User Defined | C |
| IoHwAbCustomDioChannelPrefix | true / false | C |
| IoHwAbDioChannelPrefix | User Defined | C |
| IoHwAbCustomOcuChannelPrefix | true / false | C |
| IoHwAbOcuChannelPrefix | User Defined | C |
| IoHwAbCustomAdcGroupPrefix | true / false | C |
| IoHwAbAdcGroupPrefix | User Defined | C |
| IoHwAbCustomSpiChannelPrefix | true / false | C |
| IoHwAbSpiChannelPrefix | User Defined | C |

| Parameter Name | Value | Category |
|---|---|---|
| IoHwAbCustomGptChannelPrefix | true / false | C |
| IoHwAbGptChannelPrefix | User Defined | C |
| IoHwAbCustomPwmChannelPrefix | true / false | C |
| IoHwAbPwmChannelPrefix | User Defined | C |
| IoHwAbCustomIcuChannelPrefix | true / false | C |
| IoHwAbIcuChannelPrefix | User Defined | C |

- These parameters are used to configure the custom prefix of the Mcal modules.
- To use a custom prefix user needs to select **IoHwAbCustom<Mcal_Module>Prefix** then input the prefix value in **IoHwAb<Mcal_Module>Prefix**.
- If these parameters are not configured, the default prefix values according to the Mcal vendor will be used.
- Format is used to generate: **<Default_Prefix/Custom_Prefix>_<ShortName>**.

The default values of each vendor's Mcal prefixes are provided as shown in the table below:

| | **Icu** | **Gpt** | **Pwm** | **Dio** | **Port** | **Adc** | **Spi** | |
|---|---|---|---|---|---|---|---|---|
| **INFINEON** | | | | | | | | |
| **TC3XX** | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | Pwm_17_GtmCcu6Conf_PwmChannel_ | DioConf_DioChannel_ | PortConf_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |
| **CYPRESS** | | | | | | | | |
| **CYTXXX** (CYT2B9XX /CYT4BBXX /CYT6BJ) | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | PwmConf_PwmChannel_ | DioConf_DioChannel_ | PortConf_PortPin_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |
| **NXP** | | | | | | | | |
| **S32K14X** | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | PwmConf_PwmChannelConfigSet_ | DioConf_DioChannel_ | PortConf_PortPin_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |
| **S32G2X** | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | PwmConf_PwmChannelConfigSet_ | DioConf_DioChannel_ | PortConf_PortPin_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S32K31X** | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | PwmConf_PwmChannelConfigSet_ | DioConf_DioChannel_ | PortConfigSet_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |
| **S32K31X_3_0_0_P01_HF01** | IcuConf_IcuChannel_ | GptConf_GptChannelConfiguration_ | PwmConf_PwmChannel_ | DioConf_DioChannel_ | PortConf_PortPin_ | AdcConf_AdcGroup_ | SpiConf_SpiChannel_ | SpiConf_SpiSequence_ |
| **NVIDIA** | | | | | | | | |
| **ORINX_FSI** | N/A | GptConf_GptChannelConfiguration_ | N/A | DioConf_DioChannel_ | PortConf_PortPin_ | N/A | N/A | N/A |

### 5.1.2 IoHwAbConfig Container

| Parameter Name | Value | Category |
|---|---|---|
| Use Low Power Flag | From SRS | F |
| Use PM module | From SRS | F |
| Use Digital Direct | From SRS | F |
| Use Analog Input Direct | From SRS | F |
| Use Pwm | From SRS | F |
| Use Gpt | From SRS | F |
| Use Icu | From SRS | F |
| Use IOManager | From SRS | F |
| Use Ocu | From SRS | F |

#### 5.1.2.1 IoHwAbDemEventParameterRefs

| Parameter Name | Value | Category |
|---|---|---|
| IOHWAB_E_WRONG_STATE | IOHWAB_E_WRONG_STATE | F |
| IOHWAB_E_WRONG_SETTING | IOHWAB_E_WRONG_SETTING | F |
| IOHWAB_E_WRONG_PARAM | IOHWAB_E_WRONG_PARAM | F |
| IOHWAB_E_SETUP_FAIL | IOHWAB_E_SETUP_FAIL | F |
| IOHWAB_E_PROC_FAIL | IOHWAB_E_PROC_FAIL | F |

| Parameter Name | Value | Category |
|---|---|---|
| IOHWAB_E_BUSY | IOHWAB_E_BUSY | F |

#### 5.1.2.2 IoHwAbDigitalDirectLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Port Pin Ch Ref | User Defined | C |

#### 5.1.2.3 IoHwAbAnalogInputDirectLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Adc Group Ref | User Defined | C |

#### 5.1.2.4 IoHwAbPwmLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Callback Via Rte | User Defined | C |
| Hw Pwm Ch Ref | User Defined | C |

#### 5.1.2.5 IoHwAbGptLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Callback Via Rte | User Defined | C |
| Hw Gpt Ch Ref | User Defined | C |

#### 5.1.2.6 IoHwAbIcuLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Callback Via Rte | User Defined | C |

| Parameter Name | Value | Category |
|---|---|---|
| Hw Icu Ch Ref | User Defined | C |

### 5.1.2.7 IoHwAbIOManager

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | IoHwAbIOManager | F |
| Use Analog Input | From SRS | F |
| Use Digital Input | From SRS | F |
| Use Digital Output | From SRS | F |
| Use Input Supply Switch | From SRS | F |
| Use Voltage Monitoring | From SRS | F |
| Multiple Activation Delay | 200 | F |
| TastFG1Ref | Use settings when deploying the platform | F |
| TaskFG2Ref | Use settings when deploying the platform | F |

### 5.1.2.8 IoHwAbIOMTimer

| Parameter Name | Value | Category |
|---|---|---|
| Fast Timer Ref | From SRS | F |
| Gpt Ch Ref | From SRS | F |

### 5.1.2.9 IoHwAbAnalogInputLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Direct Access | User Defined | C |
| Default Value | User Defined | C |
| Filter Constant | User Defined | C |

| Parameter Name | Value | Category |
|---|---|---|
| Adc Group Ref | User Defined | C |

### 5.1.2.10 IoHwAbDigitalInputLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Direct Access | User Defined | C |
| Low Power | User Defined | C |
| Sample Period | User Defined | C |
| DebounceH2L | User Defined | C |
| DebounceL2H | User Defined | C |
| Port Pin Ch Ref | User Defined | C |
| MC33972Pin Ref | User Defined | C |

### 5.1.2.11 IoHwAbDigitalOutputLogical

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Direct Access | User Defined | C |
| Default Value | User Defined | C |
| Port Pin Ch Ref | User Defined | C |
| L99MC6Pin Ref | User Defined | C |
| L9826Pin Ref | User Defined | C |
| TLE7240SLPin Ref | User Defined | C |

### 5.1.2.12 IoHwAbVoltageMonitoring

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Voltage Mon Hysterisis | User Defined | C |
| Voltage Mon Default Value | User Defined | C |

| Parameter Name | Value | Category |
|---|---|---|
| Voltage Mon Filter | User Defined | C |
| Voltage Mon Adc Group Ref | User Defined | C |

### 5.1.2.13 IoHwAbVoltageMonThreshold

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Value | User Defined | C |

### 5.1.2.14 IoHwAbInputSupplySwitch

| Parameter Name | Value | Category |
|---|---|---|
| Use Digital Supply Switch | From SRS | F |
| Use Analog Supply Switch | From SRS | F |

### 5.1.2.15 IoHwAbDigitalSupplySwitch

| Parameter Name | Value | Category |
|---|---|---|
| Use Digital Supply Switch LP | From SRS | F |
| Delay | User Defined | C |

### 5.1.2.16 IoHwAbDigitalSupplySwitchPin

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Use Digital Supply Switch Control In App | User Defined | C |
| Init Mode | User Defined | C |
| Port Pin Ref | User Defined | C |

### 5.1.2.17 IoHwAbAnalogSupplySwitch

| Parameter Name | Value | Category |
|---|---|---|
| Delay | User Defined | C |

#### 5.1.2.18 IoHwAbAnalogSupplySwitchPin

| Parameter Name | Value | Category |
|---|---|---|
| Port Pin Ref | From SRS | F |

#### 5.1.2.19 IoHwAbOcuLogical (AutoEver CDD module – Bolero, RH850F1L/K Platform only)

| Parameter Name | Value | Category |
|---|---|---|
| 1)Short Name | User Defined | C |
| 2)Callback Via Rte | User Defined | C |
| 3)Hw Ocu Ch Ref | User Defined | C |

#### 5.1.2.20 IoHwAbPowerState

| Parameter Name | Value | Category |
|---|---|---|
| Short Name | User Defined | C |
| Pwm Power State | User Defined | C |
| Adc Power State | User Defined | C |
| Asynch Transition Mode | User Defined | C |

## 5.2 System Configuration

### 5.2.1 ApplicationSwComponentType

Refer to AUTOSAR BSW Service API Guide.doc document.

### 5.2.2 CompositionSwComponentType

Refer to AUTOSAR BSW Service API Guide.doc document.

# 6. Application Programming Interface (API)

## 6.1 Type Definitions

### 6.1.1 IoHwAb_LevelType

| Type | uint8 | | |
|---|---|---|---|
| Range | IOHWAB_LOW | 0x00 | Signal Level is Low |
| | IOHWAB_HIGH | 0x01 | Signal Level is Low |
| Description | Signal level type for IoHwAb. | | |

### 6.1.2 IoHwAb_BoolType

| Type | uint8 | | |
|---|---|---|---|
| Range | IOHWAB_FALSE | 0x00 | False |
| | IOHWAB_TRUE | 0x01 | True |
| Description | Boolean Type for IoHwAb. | | |

### 6.1.3 IoHwAb_StatusType

| Type | uint8 |
|---|---|
| Range | 0x00 ~ 0xFF |
| Description | An 8 bit variable value that contains the flags of the module. The flags which correspond to thresholds below the battery voltage are set to 1; those which correspond to thresholds above the battery voltage are set to 0. |

### 6.1.4 IoHwAb_IcuDutyCycleType

| Type | Structure Type | |
|---|---|---|
| Range | ActiveTime | Low or High time value. |
| | PeriodTime | Period time value. |
| Description | This structureType includes two of member type( ActiveTime, PeriodTime ) | |

### 6.1.5 IoHwAb_IcuActivationType

| | | | |
|---|---|---|---|
| **Type** | uint8 | | |
| **Range** | IOHWAB_RISING_EDGE | 0x01 | Rising Edge |
| | IOHWAB_FALLING_EDGE | 0x02 | Falling Edge |
| | IOHWAB_BOTH_EDGES | 0x03 | Rising or Falling Edge (Both) |
| **Description** | Parameter used to choose the activation of the interrupts. | | |

### 6.1.6 IoHwAb_PwmEdgeType

| | | | |
|---|---|---|---|
| **Type** | uint8 | | |
| **Range** | IOHWAB_RISING_EDGE | 0x01 | Rising Edge |
| | IOHWAB_FALLING_EDGE | 0x02 | Falling Edge |
| | IOHWAB_BOTH_EDGES | 0x03 | Rising or Falling Edge (Both) |
| **Description** | Parameter used to choose the Pwm notification type of the interrupts. | | |

### 6.1.7 IoHwAb_IcuStateType

| | | | |
|---|---|---|---|
| **Type** | uint8 | | |
| **Range** | IOHWAB_IDLE | 0x00 | No activation edge has been detected since the last call of Icu_GetInputState() or Icu_Init(). |
| | IOHWAB_ACTIVE | 0x01 | An activation edge has been detected |
| **Description** | This service is re-entrant shall return the status of the ICU input. Only channels which are configured for the following Icu MeasurementMode shall be supported:<br>• ICU_MODE_SIGNAL_EDGE_DETECT,<br>• ICU_MODE_SIGNAL_MEASUREMENT. | | |

## 6.2 Macro Constants

None

## 6.3 Functions

### 6.3.1 IoHwAb_Init

#### 6.3.1.1 IoHwAb_Init

| | |
|---|---|
| *Function Name* | IoHwAb_Init |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_Init(P2CONST(IoHwAb_ConfigType, AUTOMATIC, IOHWAB_APPL_CONST) ConfigPtr) |
| *Service ID* | 1 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ConfigPtr |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize DigDir module.<br>This function is used by user. |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.2 IoHwAb_Deinit

#### 6.3.2.1 IoHwAb_Deinit

| | |
|---|---|
| *Function Name* | IoHwAb_Deinit |

| | |
|---|---|
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_Deinit(void) |
| *Service ID* | None |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ConfigPtr |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize DigDir module.<br>This function is used by user. |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.3 IoHwAb_DigDir

#### 6.3.3.1 IoHwAb_DigDirInit

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirInit |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigDirInit(void) |
| *Service ID* | 104 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Non-reentrant |
| *Parameters (In)* | None |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize DigDir module.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.3.2 IoHwAb_DigDirReadDirect

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirReadDirect |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigDirReadDirect(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Level) |
| *Service ID* | 105 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service reads the level value of DIO channel.<br>This function is used by user. |

| | |
|---|---|
| | But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DigDirReadDirect (IoHwAb_LevelType Level)<br><P> : R-Port Name |

### 6.3.3.3 IoHwAb_DigDirWriteDirect

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirWriteDirect |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigDirWriteDirect(IoHwAb_IndexType ChIdx,<br>IoHwAb_LevelType Level) |
| *Service ID* | 106 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Level |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service writes the level value of DIO channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P>_ DigDirWriteDirect (IoHwAb_LevelType Level)<br><P> : R-Port Name |

### 6.3.3.4 IoHwAb_DigDirSetToInput

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirSetToInput |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigDirSetToInput(IoHwAb_IndexType ChIdx) |
| *Service ID* | 107 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service changes the pin direction to input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ SetToInput(void)<br><P> : R-Port Name |

### 6.3.3.5 IoHwAb_DigDirSetToOutput

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirSetToOutput |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigDirSetToOutput (IoHwAb_IndexType ChIdx) |
| *Service ID* | 108 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service changes the pin direction to output.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ SetToOutput(void)<br><P> : R-Port Name |

### 6.3.3.6 IoHwAb_DigDirIsInput

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirIsInput |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigDirIsInput(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_BoolType, AUTOMATIC, IOHWAB_APPL_DATA) Result) |

| | |
|---|---|
| *Service ID* | 109 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Result |
| *Return Value* | None |
| *Description* | This Service checks whether the pin direction is input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ IsInput(IoHwAb_BoolType Result)<br><P> : R-Port Name |

### 6.3.3.7 IoHwAb_DigDirIsOutput

| | |
|---|---|
| *Function Name* | IoHwAb_DigDirIsOutput |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigDirIsOutput<br>(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_BoolType,<br>AUTOMATIC, IOHWAB_APPL_DATA) Result) |
| *Service ID* | 110 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Result |
| *Return Value* | None |
| *Description* | This Service checks whether the pin direction is output.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ IsOutput(IoHwAb_BoolType Result)<br><P> : R-Port Name |

### 6.3.4 IoHwAb_AnaInDir

#### 6.3.4.1 IoHwAb_AnaInDirReadDirect

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInDirReadDirect |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_AnaInDirReadDirect(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_ValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Value, IoHwAb_LengthType Length) |
| *Service ID* | 154 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Non-reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |

| | |
|---|---|
| *Parameters (Out)* | Value |
| *Return Value* | None |
| *Description* | This API reads the analog signals directly from the analog converter.<br>➔ e.g. IoHwAb_AnaInDirReadDirect (4, &ruw_result, 1)<br>reads the analog signal directly from the ADC line.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ ReadDirect(IoHwAb_ValueType Value)<br><P> : R-Port Name |

### 6.3.5 IoHwAb_Gpt

#### 6.3.5.1 IoHwAb_GptStartTimer

| | |
|---|---|
| *Function Name* | IoHwAb_GptStartTimer |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)IoHwAb_GptStartTimer(IoHwAb_IndexType ChIdx, IoHwAb_GptValueType Value) |
| *Service ID* | 254 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Value |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |

| | |
|---|---|
| *Return Value* | LddError |
| *Description* | This Service starts the timer of the corresponding GPT channel.<br>This function is used by BSW. |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StartTimer(IoHwAb_GptValueType Value)<br><P> : R-Port Name |

### 6.3.5.2 IoHwAb_GptStopTimer

| | |
|---|---|
| *Function Name* | IoHwAb_GptStopTimer |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_GptStopTimer(IoHwAb_IndexType ChIdx) |
| *Service ID* | 255 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service stops the timer of the corresponding GPT channel.<br>This function is used by BSW. |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StopTimer(void)<br><P> : R-Port Name |

### 6.3.5.3 IoHwAb_GptGetTimeElapsed

| | |
|---|---|
| *Function Name* | IoHwAb_GptGetTimeElapsed |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_GptGetTimeElapsed(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_GptValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Value) |
| *Service ID* | 256 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service reads the elapsed time value of the corresponding GPT channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P>_ GetTimeElapsed(IoHwAb_GptValueType Value)<br><P> : R-Port Name |

### 6.3.5.4 IoHwAb_GptGetTimeRemaining

| | |
|---|---|
| *Function Name* | IoHwAb_GptGetTimeRemaining |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_GptGetTimeRemaining(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_GptValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Value) |
| *Service ID* | 257 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | LddError |
| *Description* | This Service reads the remaining time value of the corresponding GPT channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P> _TimeRemaining (IoHwAb_GptValueType Value)<br><P> : R-Port Name |

### 6.3.5.5 IoHwAb_GptDisableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_GptDisableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_GptDisableNotification(IoHwAb_IndexType ChIdx) |
| *Service ID* | 258 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service disables notification feature of corresponding GPT channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableNotification (void)<br><P> : R-Port Name |

### 6.3.5.6 IoHwAb_GptEnableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_GptEnableNotification |

| | |
|---|---|
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_GptEnableNotification (IoHwAb_IndexType ChIdx) |
| *Service ID* | 259 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service enables notification feature of corresponding GPT channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableNotification (void)<br><P> : R-Port Name |

### 6.3.6 IoHwAb_Icu

#### 6.3.6.1 IoHwAb_IcuSetActivationCondition

| | |
|---|---|
| *Function Name* | IoHwAb_IcuSetActivationCondition |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuSetActivationCondition(IoHwAb_IndexType ChIdx, |

| | |
|---|---|
| | IoHwAb_IcuActivationType Activation) |
| *Service ID* | 304 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Activation |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service changes the activation condition of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ SetActivationCondition (IoHwAb_IcuActivationType Activation)<br><P> : R-Port Name |

### 6.3.6.2 IoHwAb_IcuDisableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_IcuDisableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuDisableNotification(IoHwAb_IndexType ChIdx) |
| *Service ID* | 305 |

| | |
|---|---|
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service disables notification feature of corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableNotification (void)<br><P> : R-Port Name |

### 6.3.6.3 IoHwAb_IcuEnableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_IcuEnableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuEnableNotification (IoHwAb_IndexType ChIdx) |
| *Service ID* | 306 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service enables notification feature of corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableNotification (void)<br><P> : R-Port Name |

### 6.3.6.4 IoHwAb_IcuGetInputState

| | |
|---|---|
| *Function Name* | IoHwAb_IcuGetInputState |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuGetInputState(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuStateType, AUTOMATIC, IOHWAB_APPL_DATA)<br>State) |
| *Service ID* | 307 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | State |

| | |
|---|---|
| *Return Value* | LddError |
| *Description* | This Service reads the input pin state of corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_GetInputState (IoHwAb_IcuStateType State)<br><P> : R-Port Name |

### 6.3.6.5 IoHwAb_IcuStartTimestamp

| | |
|---|---|
| *Function Name* | IoHwAb_IcuStartTimestamp |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuStartTimestamp(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>BufPtr, uint16 BufSize, uint16 NotiItv) |
| *Service ID* | 308 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, BufSize, NotiItv |
| *Parameters (Inout)* | BufPtr |
| *Parameters (Out)* | State |
| *Return Value* | LddError |
| *Description* | This Service starts timestamp feature of corresponding ICU |

| | |
|---|---|
| | channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_StartTimestamp (IoHwAb_IcuValueType* BufPtr, AUTOSAR_uint16 BufSize, AUTOSAR_uint16 NotiItv)<br><P> : R-Port Name |

### 6.3.6.6 IoHwAb_IcuStopTimestamp

| | |
|---|---|
| *Function Name* | IoHwAb_IcuStopTimestamp |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuStartTimestamp(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>BufPtr, uint16 BufSize, uint16 NotiItv) |
| *Service ID* | 309 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service stops timestamp feature of corresponding ICU channel.<br>This function is used by user. |

| | |
|---|---|
| | But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StopTimestamp (void)<br><P> : R-Port Name |

### 6.3.6.7 IoHwAb_IcuGetTimestampIndex

| | |
|---|---|
| *Function Name* | IoHwAb_IcuGetTimestampIndex |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuGetTimestampIndex(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuIndexType, AUTOMATIC, IOHWAB_APPL_DATA)<br>TimestampIdx) |
| *Service ID* | 310 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | TimestampIdx |
| *Return Value* | LddError |
| *Description* | This Service returns the array index number timestamp buffer of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ GetTimestampIndex (IoHwAb_IcuIndexType * TimestampIdx)<br><P> : R-Port Name |

### 6.3.6.8 IoHwAb_IcuResetEdgeCount

| | |
|---|---|
| *Function Name* | IoHwAb_IcuResetEdgeCount |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuResetEdgeCount(IoHwAb_IndexType ChIdx) |
| *Service ID* | 311 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service resets edge counter value of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P>_ ResetEdgeCount (void)<br><P> : R-Port Name |

### 6.3.6.9 IoHwAb_IcuEnableEdgeCount

| | |
|---|---|
| *Function Name* | IoHwAb_IcuEnableEdgeCount |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuEnableEdgeCount(IoHwAb_IndexType ChIdx) |
| *Service ID* | 312 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service enables edge count feature of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableEdgeCount (void)<br><P> : R-Port Name |

### 6.3.6.10 IoHwAb_IcuDisableEdgeCount

| | |
|---|---|
| *Function Name* | IoHwAb_IcuDisableEdgeCount |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuDisableEdgeCount(IoHwAb_IndexType ChIdx) |
| *Service ID* | 313 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service disables edge count feature of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableEdgeCount(void)<br><P> : R-Port Name |

### 6.3.6.11 IoHwAb_IcuGetEdgeNumbers

| | |
|---|---|
| *Function Name* | IoHwAb_IcuGetEdgeNumbers |

| | |
|---|---|
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_IcuGetEdgeNumbers(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_IcuEdgeNumberType, AUTOMATIC, IOHWAB_APPL_DATA) Num) |
| *Service ID* | 314 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Num |
| *Return Value* | LddError |
| *Description* | This Service reads the edge counter value of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_GetEdgeNumbers(IoHwAb_IcuEdgeNumberType* Num)<br><P> : R-Port Name |

### 6.3.6.12 IoHwAb_IcuEnableEdgeDetection

| | |
|---|---|
| *Function Name* | IoHwAb_IcuEnableEdgeDetection |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_IcuEnableEdgeDetection(IoHwAb_IndexType ChIdx) |

| | |
|---|---|
| *Service ID* | 315 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Num |
| *Return Value* | LddError |
| *Description* | This Service enables edge detect feature of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableEdgeDetection(void)<br><P> : R-Port Name |

### 6.3.6.13 IoHwAb_IcuDisableEdgeDetection

| | |
|---|---|
| *Function Name* | IoHwAb_IcuDisableEdgeDetection |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuDisableEdgeDetection(IoHwAb_IndexType ChIdx) |
| *Service ID* | 316 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Num |
| *Return Value* | LddError |
| *Description* | This Service disables edge detect feature of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableEdgeDetection(void)<br><P> : R-Port Name |

### 6.3.6.14 IoHwAb_IcuStartSignalMeasurement

| | |
|---|---|
| *Function Name* | IoHwAb_IcuStartSignalMeasurement |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuStartSignalMeasurement(IoHwAb_IndexType ChIdx) |
| *Service ID* | 317 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Num |

| | |
|---|---|
| *Return Value* | LddError |
| *Description* | This Service starts signal measurement feature of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StartSignalMeasurement(void)<br><P> : R-Port Name |

### 6.3.6.15 IoHwAb_IcuStopSignalMeasurement

| | |
|---|---|
| *Function Name* | IoHwAb_IcuStopSignalMeasurement |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuStopSignalMeasurement (IoHwAb_IndexType ChIdx) |
| *Service ID* | 318 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Num |
| *Return Value* | LddError |
| *Description* | This Service stops signal measurement feature of the corresponding ICU channel.<br>This function is used by user. |

| | |
|---|---|
| | But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StopSignalMeasurement(void)<br><P> : R-Port Name |

### 6.3.6.16 IoHwAb_IcuGetTimeElapsed

| | |
|---|---|
| *Function Name* | IoHwAb_IcuGetTimeElapsed |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuGetTimeElapsed(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Time) |
| *Service ID* | 319 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Time |
| *Return Value* | LddError |
| *Description* | This Service reads the elapsed time value of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_GetTimeElapsed(IoHwAb_IcuValueType * Time)<br><P> : R-Port Name |

### 6.3.6.17 IoHwAb_IcuGetDutyCycleValues

| | |
|---|---|
| *Function Name* | IoHwAb_IcuGetDutyCycleValues |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_IcuGetDutyCycleValues(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_IcuDutyCycleType, AUTOMATIC,<br>IOHWAB_APPL_DATA) DutyCycle) |
| *Service ID* | 320 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | DutyCycle |
| *Return Value* | LddError |
| *Description* | This Service reads the duty cycle value of the corresponding ICU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P>_GetDutyCycleValues(IoHwAb_IcuDutyCycleType* DutyCycle)<br><P> : R-Port Name |

### 6.3.7 IoHwAb_Pwm

#### 6.3.7.1 IoHwAb_PwmSetDutyCycle

| | |
|---|---|
| *Function Name* | IoHwAb_PwmSetDutyCycle |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_PwmSetDutyCycle(IoHwAb_IndexType ChIdx, uint16 Duty) |
| *Service ID* | 204 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Duty |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service changes the duty cycle value of corresponding PWM channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P> _SetDutyCycle(uint16 Duty)<br><P> : R-Port Name |

### 6.3.7.2 IoHwAb_PwmSetPeriodAndDuty

| | |
|---|---|
| *Function Name* | IoHwAb_PwmSetPeriodAndDuty |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_PwmSetPeriodAndDuty(IoHwAb_IndexType ChIdx,<br>IoHwAb_PwmPeriodType Period, uint16 Duty) |
| *Service ID* | 205 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Period, Duty |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service changes both the period and duty cycle value of corresponding PWM channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_SetPeriodAndDuty(IoHwAb_PwmPeriodType Period, uint16 Duty)<br><P> : R-Port Name |

### 6.3.7.3 IoHwAb_PwmSetOutputToIdle

| | |
|---|---|
| *Function Name* | IoHwAb_PwmSetOutputToIdle |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_PwmSetOutputToIdle(IoHwAb_IndexType ChIdx) |
| *Service ID* | 206 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service changes output pin of corresponding PWM channel to idle state.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ SetOutputToIdle(void)<br><P> : R-Port Name |

### 6.3.7.4 IoHwAb_PwmGetOutputState

| | |
|---|---|
| *Function Name* | IoHwAb_PwmGetOutputState |

| | |
|---|---|
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_PwmGetOutputState(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 207 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | LddError |
| *Description* | This Service reads the output state of corresponding PWM channel to idle state.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ GetOutputState(IoHwAb_LevelType* Level)<br><P> : R-Port Name |

### 6.3.7.5 IoHwAb_PwmDisableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_PwmDisableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_PwmDisableNotification(IoHwAb_IndexType ChIdx) |

| | |
|---|---|
| *Service ID* | 208 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service disables notification feature of the corresponding PWM channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableNotification(void)<br><P> : R-Port Name |

### 6.3.7.6 IoHwAb_PwmEnableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_PwmEnableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_PwmEnableNotification(IoHwAb_IndexType ChIdx,<br>IoHwAb_PwmEdgeType NotificationEdge) |
| *Service ID* | 209 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | ChIdx, NotificationEdge |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service enables notification feature of the corresponding PWM channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableNotification(IoHwAb_PwmEdgeType NotificationEdge)<br><P> : R-Port Name |

### 6.3.8 IoHwAb_IOM

#### 6.3.8.1 IoHwAb_IOML2H

| | |
|---|---|
| *Function Name* | IoHwAb_IOML2H |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_IOML2H (void) |
| *Service ID* | 360 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service prepare all IO modules for high power mode.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.8.2 IoHwAb_IOMH2L

| | |
|---|---|
| *Function Name* | IoHwAb_IOMH2L |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_IOMH2L (void) |
| *Service ID* | 361 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service prepare all IO modules for low power mode.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |

### 6.3.8.3 IoHwAb_IOMInputsLP

| | |
|---|---|
| *Function Name* | IoHwAb_IOMInputsLP |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_IOMInputsLP (void) |
| *Service ID* | 362 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service sample all digital inputs available in low power.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.8.4 IoHwAb_IOMOutputsLP

| | |
|---|---|
| *Function Name* | IoHwAb_IOMOutputsLP |

| | |
|---|---|
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_IOMOutputsLP (void) |
| *Service ID* | 363 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service update all digital outputs available in low power.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.9 IoHwAb_AnaIn

#### 6.3.9.1 IoHwAb_AnaInInit

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInInit |
| *Syntax:* | FUNC(void, IOHWAB_CODE)IoHwAb_AnaInInit(void) |
| *Service ID* | 504 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize AnaIn module.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.9.2 IoHwAb_AnaInRead

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInRead |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_AnaInRead(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_ValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Value) |
| *Service ID* | 507 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | None |
| *Description* | This Service provides the access to the filtered value of the |

| | |
|---|---|
| | defined logical input signal.<br>e.g IoHwAb_AnaInRead (1, &ruw_result)<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Read(IoHwAb_ValueType* Value)<br><P> : R-Port Name |

### 6.3.9.3 IoHwAb_AnaInReadDirect

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInReadDirect |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_AnaInReadDirect(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_ValueType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Value) |
| *Service ID* | 508 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Non-reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service reads the analog signals directly from the analog converter.<br>➔ e.g. IoHwAb_AnaInDirReadDirect (4, &ruw_result) |

| | |
|---|---|
| | reads the analog signal directly from the ADC line.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ReadDirect(IoHwAb_ValueType* Value)<br><P> : R-Port Name |

### 6.3.9.4 IoHwAb_AnaInFreeze

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInFreeze |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_AnaInFreeze(IoHwAb_IndexType ChIdx) |
| *Service ID* | 509 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service freezes the filtering of the specified analog input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ Freeze(void)<br><P> : R-Port Name |

### 6.3.9.5 IoHwAb_AnaInUnfreeze

| | |
|---|---|
| *Function Name* | IoHwAb_AnaInUnfreeze |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_AnaInUnfreeze<br>(IoHwAb_IndexType ChIdx) |
| *Service ID* | 510 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service Unfreezes the filtering of the specified analog input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Unfreeze(void)<br><P> : R-Port Name |

### 6.3.10 IoHwAb_DigIn

#### 6.3.10.1 IoHwAb_DigInRead

| | |
|---|---|
| *Function Name* | IoHwAb_DigInRead |
| *Syntax:* | FUNC(void,IOHWAB_CODE)<br>IoHwAb_DigInRead(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Level) |
| *Service ID* | 454 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service provides read access to the debounced value of the logical input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Read(IoHwAb_LevelType* Level)<br><P> : R-Port Name |

#### 6.3.10.2 IoHwAb_DigInReadRaw

| | |
|---|---|
| *Function Name* | IoHwAb_DigInReadRaw |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_DigInReadRaw(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 455 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service provides read access to the logical value of the logical input.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ ReadRaw(IoHwAb_LevelType* Level)<br><P> : R-Port Name |

### 6.3.10.3 IoHwAb_DigInReadDirect

| | |
|---|---|
| *Function Name* | IoHwAb_DigInReadDirect |

| | |
|---|---|
| *Syntax:* | FUNC(void,IOHWAB_CODE)<br>IoHwAb_DigInReadDirect(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 456 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service provides read access for the value of the input.<br>It reads directly the logical value of the port pin.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ReadDirect(IoHwAb_LevelType* Level)<br><P> : R-Port Name |

### 6.3.10.4 IoHwAb_DigInWrite

| | |
|---|---|
| *Function Name* | IoHwAb_DigInWrite |
| *Syntax:* | FUNC(void,IOHWAB_CODE)<br>IoHwAb_DigInWrite(IoHwAb_IndexType ChIdx, IoHwAb_LevelType Level) |

| | |
|---|---|
| *Service ID* | 457 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Level |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service provides write access to the debounced value of the logical input. The debounced value of the input can be initialized to its maximum or minimum.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Write(IoHwAb_LevelType Level)<br><P> : R-Port Name |

### 6.3.10.5 IoHwAb_DigInFreeze

| | |
|---|---|
| *Function Name* | IoHwAb_DigInFreeze |
| *Syntax:* | FUNC(void,IOHWAB_CODE)IoHwAb_DigInFreeze(IoHwAb_IndexType ChIdx) |
| *Service ID* | 458 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service provides freeze status of the input. It can be used by the user to find out if the specified input is updated and debounced or not.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Freeze(void)<br><P> : R-Port Name |

### 6.3.10.6 IoHwAb_DigInUnfreeze

| | |
|---|---|
| *Function Name* | IoHwAb_DigInUnfreeze |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_DigInUnfreeze<br>(IoHwAb_IndexType ChIdx) |
| *Service ID* | 459 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |

| | |
|---|---|
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service enables the updating and debouncing of the input, if it has been frozen. It can be used by the user to start the reading and debouncing of an input when the battery voltage is inside certain ranges.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_Unfreeze(void)<br><P> : R-Port Name |

### 6.3.10.7 IoHwAb_DigInIsFrozen

| | |
|---|---|
| *Function Name* | IoHwAb_DigInIsFrozen |
| *Syntax:* | FUNC(void,IOHWAB_CODE)<br>IoHwAb_DigInIsFrozen(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_BoolType, AUTOMATIC, IOHWAB_APPL_DATA)<br>Result) |
| *Service ID* | 460 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | BufIdx, PortIdx, ChIdx |
| *Parameters (Inout)* | None |

| | |
|---|---|
| *Parameters (Out)* | Result |
| *Return Value* | None |
| *Description* | This Service provides freeze status of the input. It can be used by the user to find out if the specified input is updated and debounced or not.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_IsFrozen(IoHwAb_BoolType* Result)<br><P> : R-Port Name |

### 6.3.10.8 IoHwAb_DigInMC33972IntermediateWakeUp

| | |
|---|---|
| *Function Name* | IoHwAb_DigInMC33972IntermediateWakeUp |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigInMC33972IntermediateWakeUp(void) |
| *Service ID* | 471 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service disable the wakeup sources and move to High power |

| | |
|---|---|
| | mode immediately.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11 IoHwAb_DigOut

#### 6.3.11.1 IoHwAb_DigOutInit

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutInit |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_DigOutInit (void) |
| *Service ID* | 404 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize DigOut module.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |

### 6.3.11.2 IoHwAb_DigOutDeInit

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutDeInit |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutDeInit(void) |
| *Service ID* | 405 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service deinitilize DigOut module.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.3 IoHwAb_DigOutWrite

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutWrite |

| | |
|---|---|
| *Syntax:* | FUNC(void, IOHWAB_CODE)IoHwAb_DigOutWrite(IoHwAb_IndexType ChIdx, IoHwAb_LevelType Level) |
| *Service ID* | 406 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Level |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service write output signal to the output buffer.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ Write(IoHwAb_LevelType Level)<br><P> : R-Port Name |

### 6.3.11.4 IoHwAb_DigOutWriteDirect

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutWriteDirect |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutWriteDirect (IoHwAb_IndexType ChIdx, IoHwAb_LevelType Level) |
| *Service ID* | 407 |
| *Sync/Async* | Synchronous |

| | |
|---|---|
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Level |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service write output signal to MCU register directely via MCAL.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_WriteDirect(IoHwAb_LevelType Level)<br><P> : R-Port Name |

### 6.3.11.5 IoHwAb_DigOutRead

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutRead |
| *Syntax:* | FUNC(void, IOHWAB_CODE)IoHwAb_DigOutRead(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_LevelType, AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 408 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This service read output signal from buffer.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ ReadDirect(IoHwAb_LevelType* Level)<br><P> : R-Port Name |

### 6.3.11.6 IoHwAb_DigOutReadDirect

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutReadDirect |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutReadDirect<br>(IoHwAb_IndexType ChIdx, P2VAR(IoHwAb_LevelType,<br>AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 409 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service read output signal to MCU register directely via |

| | |
|---|---|
| | MCAL.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ ReadDirect( IoHwAb_LevelType* Level)<br><P> : R-Port Name |

### 6.3.11.7 IoHwAb_DigOutWriteOutputsToHW

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutWriteOutputsToHW |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutWriteOutputsToHW(void) |
| *Service ID* | 410 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Level |
| *Return Value* | None |
| *Description* | This Service upated the Output signal buffer.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |

### 6.3.11.8 IoHwAb_DigOutGetFailure

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutGetFailure |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutGetFailure (IoHwAb_IndexType ChIdx) |
| *Service ID* | 411 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service return error when L9826 buffer update failure.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.9 IoHwAb_DigOutL9826SwitchOn

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL9826SwitchOn |

| | |
|---|---|
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutL9826SwitchOn(void) |
| *Service ID* | 412 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | Initialize the L9826.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.10 IoHwAb_DigOutL9826SwitchOff

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL9826SwitchOff |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_DigOutL9826SwitchOff (void) |
| *Service ID* | 413 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |

| | |
|---|---|
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service deInitialize the L9826.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.11 IoHwAb_DigOutL9826

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL9826 |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutL9826(void) |
| *Service ID* | 414 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service performs value writing and output diagnosis. (10ms periodic)<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |

| | |
|---|---|
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.12 IoHwAb_DigOutL99MC6SwitchOn

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL99MC6SwitchOn |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutL99MC6SwitchOn (void) |
| *Service ID* | 415 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service initialize the L99MC6.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.13 IoHwAb_DigOutL99MC6SwitchOff

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL99MC6SwitchOff |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutL99MC6SwitchOff (void) |
| *Service ID* | 416 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service deInitialize the L99MC6.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.14 IoHwAb_DigOutL99MC6

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutL99MC6 |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutL99MC6 (void) |
| *Service ID* | 417 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service performs value writing and output diagnosis. (10ms periodic)<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.15 IoHwAb_DigOutTLE7240SLSwitchOn

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutTLE7240SLSwitchOn |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutTLE7240SLSwitchOn (void) |
| *Service ID* | 418 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service set TLE7240SL to enter the normal operation mode (ou |

| | |
|---|---|
| | tput pin is set as standby-mode).<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.16 IoHwAb_DigOutTLE7240SLSwitchOff

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutTLE7240SLSwitchOff |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutTLE7240SLSwitchOff (void) |
| *Service ID* | 419 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service set TLE7240SL to enter the standby mode.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.17 IoHwAb_DigOutTLE7240SL

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutTLE7240SL |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_DigOutTLE7240SL (void) |
| *Service ID* | 420 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service update the value for Demux output via SPI channel in every 10ms.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.11.18 IoHwAb_DigOutTLE7240SLGetOpenLoad

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutTLE7240SLGetOpenLoad |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigOutTLE7240SLGetOpenLoad<br>(IoHwAb_IndexType ChIdx, |

| | |
|---|---|
| | P2VAR(IoHwAb_LevelType,AUTOMATIC, IOHWAB_APPL_DATA) Level) |
| *Service ID* | 421 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service detect Open load and info to User.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_GetOpenLoad (void)<br><P> : R-Port Name |

### 6.3.11.19 IoHwAb_DigOutTLE7240SLGetOverCurrent

| | |
|---|---|
| *Function Name* | IoHwAb_DigOutTLE7240SLGetOverCurrent |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_DigOutTLE7240SLGetOverCurrent<br>(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_LevelType,AUTOMATIC, IOHWAB_APPL_DATA)<br>Level) |

| | |
|---|---|
| *Service ID* | 422 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddReturnvalue |
| *Description* | This Service detect Over Current and info to User.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_GetOverCurrent (void)<br><P> : R-Port Name |

### 6.3.12 IoHwAb_VolMon

#### 6.3.12.1 IoHwAb_VolMonInit

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonInit |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_VolMonInit (void) |
| *Service ID* | 544 |
| *Sync/Async* | Synchronous |

| | |
|---|---|
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initilize VolMon module.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.2 IoHwAb_VolMon

| | |
|---|---|
| *Function Name* | IoHwAb_VolMon |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_VolMon(void) |
| *Service ID* | 555 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service check voltage level for every 10ms. |

| | |
|---|---|
| | This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.3 IoHwAb_VolMonRead

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonRead |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_VolMonRead(P2VAR(IoHwAb_ValueType, AUTOMATIC, IOHWAB_APPL_DATA) Value) |
| *Service ID* | 556 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | None |
| *Description* | This Service read ADC value of connected port-pin.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.4 IoHwAb_VolMonGetStatus

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonGetStatus |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_VolMonGetStatus(P2VAR(IoHwAb_StatusType, AUTOMATIC, IOHWAB_APPL_DATA) Status) |
| *Service ID* | 557 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Status |
| *Return Value* | None |
| *Description* | This Service return status of voltage value on threshold range.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.5 IoHwAb_VolMonIsThresholdOver

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonIsThresholdOver |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_VolMonIsThresholdOver(IoHwAb_ThresholdType Threshold, |

| | |
|---|---|
| | P2VAR(IoHwAb_BoolType, AUTOMATIC, IOHWAB_APPL_DATA) Result) |
| *Service ID* | 558 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | Threshold |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Result |
| *Return Value* | None |
| *Description* | This Service return True when voltage value is over specific configured threshold value.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.6 IoHwAb_VolMonIsThresholdUnder

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonIsThresholdUnder |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_VolMonIsThresholdUnder (IoHwAb_ThresholdType Threshold, P2VAR(IoHwAb_BoolType, AUTOMATIC, IOHWAB_APPL_DATA) Result) |
| *Service ID* | 559 |
| *Sync/Async* | Synchronous |

| | |
|---|---|
| *Reentrancy* | Reentrant |
| *Parameters (In)* | Threshold |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Result |
| *Return Value* | None |
| *Description* | This Service return True when voltage value is under specific configured threshold value.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.12.7 IoHwAb_VolMonNotification

| | |
|---|---|
| *Function Name* | IoHwAb_VolMonNotification |
| *Syntax:* | FUNC(void, IOHWAB_CODE) IoHwAb_VolMonNotification(void) |
| *Service ID* | 560 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | Threshold |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |

| | |
|---|---|
| *Description* | This function notifies the transition of battery level to application.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.13 IoHwAb_InputSupply

#### 6.3.13.1 IoHwAb_InputSupplyInit

| | |
|---|---|
| *Function Name* | IoHwAb_InputSupplyInit |
| *Syntax:* | FUNC(void,IOHWAB_CODE) IoHwAb_InputSupplyInit (void) |
| *Service ID* | 604 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | None |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service initialize the Input Supply switch<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |

### 6.3.13.2 IoHwAb_InputSupplyDigitalControl

| | |
|---|---|
| *Function Name* | IoHwAb_InputSupplyDigitalControl |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_InputSupplyDigitalControl(boolean blHp, boolean blOn) |
| *Service ID* | 605 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | blHp, blOn |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service Enable/Disable the function of Digital input Supply switch in HP/LP mode.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.13.3 IoHwAb_InputSupplySwControl

| | |
|---|---|
| *Function Name* | IoHwAb_InputSupplySwControl |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_InputSupplySwControl(IoHwAb_IndexType ChIdx,<br>IoHwAb_LevelType Level) |
| *Service ID* | 606 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx, Level |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service On/Off the specific input supply switch pin.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.13.4 IoHwAb_InputSupplyAnalogControl

| | |
|---|---|
| *Function Name* | IoHwAb_InputSupplyAnalogControl |
| *Syntax:* | FUNC(void, IOHWAB_CODE)<br>IoHwAb_InputSupplyAnalogControl(boolean blOn) |
| *Service ID* | 607 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |

| | |
|---|---|
| *Parameters (In)* | blHp, blOn |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | None |
| *Description* | This Service Enable/Disable the function of Analog input Supply switch in HP mode.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

### 6.3.14 IoHwAb_McuSpecific

#### 6.3.14.1 IoHwAb_McuSpecificControlIBE

| | |
|---|---|
| *Function Name* | IoHwAb_McuSpecificControlIBE |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_McuSpecificControlIBE(<br>IoHwAb_IndexType PortGroup,<br>IoHwAb_IndexType PinConfig, IoHwAb_LevelType Level) |
| *Service ID* | 704 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | PortGroup, PinConfig, Level |
| *Parameters (Inout)* | None |

| | |
|---|---|
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service service to controle Bolero IBE register value.<br>Provided only for Bolero Mcu.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | Rte_Call_<P>_ControlIBE(<br>IoHwAb_McuSpecificControlIBE(<br>IoHwAb_IndexType PortGroup,<br>IoHwAb_IndexType PinConfig,<br>IoHwAb_LevelType Level )<br><P> : R-Port Name |

### 6.3.15 IoHwAb_Ocu

#### 6.3.15.1 IoHwAb_OcuStartChannel

| | |
|---|---|
| *Function Name* | IoHwAb_OcuStartTimer |
| *Syntax:* | FUNC(Std_ReturnType,IOHWAB_CODE)IoHwAb_OcuStartChannel<br>(IoHwAb_IndexType ChIdx) |
| *Service ID* | 654 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |

| | |
|---|---|
| *Return Value* | LddError |
| *Description* | This Service starts the timer of the corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StartChannel(void)<br><P> : R-Port Name |

### 6.3.15.2 IoHwAb_OcuStopChannel

| | |
|---|---|
| *Function Name* | IoHwAb_OcuStopTimer |
| *Syntax:* | FUNC(Std_ReturnType,IOHWAB_CODE) IoHwAb_OcuStopChannel (IoHwAb_IndexType ChIdx) |
| *Service ID* | 655 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service stops the timer of the corresponding OCU channel.<br>This function is used by user. |

| | |
|---|---|
| | But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ StopTimer(void)<br><P> : R-Port Name |

### 6.3.15.3 IoHwAb_OcuGetCounter

| | |
|---|---|
| *Function Name* | IoHwAb_OcuGetCounter |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_OcuGetCounter(IoHwAb_IndexType ChIdx,<br>P2VAR(IoHwAb_OcuValueType,AUTOMATIC, IOHWAB_APPL_DATA)<br>Value) |
| *Service ID* | 658 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service reads the time counter value of the corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ GetCounter (IoHwAb_OcuValueType Value)<br><P> : R-Port Name |

### 6.3.15.4 IoHwAb_OcuSetAbsoluteThreshold

| | |
|---|---|
| *Function Name* | IoHwAb_OcuSetAbsoluteThreshold |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_OcuSetAbsoluteThreshold(IoHwAb_IndexType ChIdx, IoHwAb_OcuValueType ReferenceValue, IoHwAb_OcuValueType AbsoluteValue, P2VAR(IoHwAb_OcuReturnType, AUTOMATIC, IOHWAB_APPL_DATA) ThresholdResult) |
| *Service ID* | 659 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | LddError |
| *Description* | This Service Set the Absolute Threshold value to the corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P> _ SetAbsoluteThreshold(<br>IoHwAb_OcuValueType ReferenceValue,<br>IoHwAb_OcuValueType AbsoluteValue,<br>P2VAR(IoHwAb_OcuReturnType, AUTOMATIC, RTE_APPL_DATA)<br>Value)<br><P> : R-Port Name |

### 6.3.15.5 IoHwAb_OcuSetRelativeThreshold

| | |
|---|---|
| *Function Name* | IoHwAb_OcuSetRelativeThreshold |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_OcuSetRelativeThreshold(IoHwAb_IndexType ChIdx,<br>IoHwAb_OcuValueType RelativeValue,<br>P2VAR(IoHwAb_OcuReturnType, AUTOMATIC, IOHWAB_APPL_DATA)<br>ThresholdResult) |
| *Service ID* | 660 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | LddError |
| *Description* | This Service Set the Relative Threshold value to the corresponding OCU channel.<br>This function is used by user. |

| | |
|---|---|
| | But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P> _ SetRelativeThreshold(<br>IoHwAb_OcuValueType RelativeValue,<br>P2VAR(IoHwAb_OcuReturnType, AUTOMATIC, RTE_APPL_DATA)<br>PinAction)<P> : R-Port Name |

### 6.3.15.6 IoHwAb_OcuSetPinState

| | |
|---|---|
| *Function Name* | IoHwAb_Ocu_SetPinState |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_OcuSetPinState(IoHwAb_IndexType ChIdx,<br>IoHwAb_OcuPinStateType PinState) |
| *Service ID* | 656 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | LddError |
| *Description* | This Service Set the Pin state of the corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |

| | |
|---|---|
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P> _ SetPinState ( IoHwAb_OcuPinStateType PinState) PinState)<br><P> : R-Port Name |

### 6.3.15.7 IoHwAb_OcuSetPinAction

| | |
|---|---|
| *Function Name* | IoHwAb_Ocu_SetPinAction |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_OcuSetPinAction(IoHwAb_IndexType ChIdx, IoHwAb_OcuPinActionType PinAction) |
| *Service ID* | 657 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | Value |
| *Return Value* | LddError |
| *Description* | This Service Set the Pin action of the corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |

| | |
|---|---|
| *In Communication with application SW-C* | Rte_Call_<P> _ SetPinAction ( IoHwAb_OcuPinActionType PinState) PinAction)<br><P> : R-Port Name |

### 6.3.15.8 IoHwAb_OcuDisableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_OcuDisableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE) IoHwAb_OcuDisableNotification(IoHwAb_IndexType ChIdx) |
| *Service ID* | 662 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service disables notification feature of corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ DisableNotification (void)<br><P> : R-Port Name |

### 6.3.15.9 IoHwAb_OcuEnableNotification

| | |
|---|---|
| *Function Name* | IoHwAb_OcuEnableNotification |
| *Syntax:* | FUNC(Std_ReturnType, IOHWAB_CODE)<br>IoHwAb_OcuEnableNotification (IoHwAb_IndexType ChIdx) |
| *Service ID* | 661 |
| *Sync/Async* | Synchronous |
| *Reentrancy* | Reentrant |
| *Parameters (In)* | ChIdx |
| *Parameters (Inout)* | None |
| *Parameters (Out)* | None |
| *Return Value* | LddError |
| *Description* | This Service enables notification feature of corresponding OCU channel.<br>This function is used by user.<br>But it needs configuration. (It cannot be called directly by user) |
| *Preconditions* | NA |
| *Configuration Dependency* | None |
| *In Communication with application SW-C* | Rte_Call_<P>_ EnableNotification (void)<br><P> : R-Port Name |

## 6.4 Service Interfaces

None

## 6.5 Notes

### 6.5.1 In Communication with application SW-C

For the prototype of the RTE-based generated function, see the AUTOSAR BSW Service API Guide.doc document.

### 6.5.2 IoHwAb_AnaInDirReadDirect / IoHwAb_AnaInReadDirect for ASW design

As API IoHwAb_AnaInDirReadDirect / IoHwAb_AnaInReadDirect are not reentrant functions. Application Software should be designed with users taking that fact into account.

### 6.5.3 IoHwAb_DigDirIsInput/ IoHwAb_DigDirIsOutput

The API IsInput and IsOutput (IoHwAb_If_DigDir) return always false if the user does not set PortPinDirection to PORT_PIN_IN or PORT_PIN_OUT

### 6.5.4 IoHwAb_IcuEnableEdgeDetection / IoHwAb_IcuDisableEdgeDetection in RH850U2A

In RH850U2A, Icu_DisableEdgeDetection suspends an interrupt due to edge detection. Therefore, the interrupt may occur immediately after IoHwAb_IcuEnableEdgeDetection is executed.

# 7. Generator

## 7.1 Generator Option

| Options | Description |
|---|---|
| -G,--Generation | Symbolic parameters to be used for fore generation (skip validation). |
| -H,--Help | Display this help message. |
| -I,--Input <I> | ECU description file path of the module for which generation tool need to run. |

| | |
|---|---|
| -L,--Log | Symbolic parameters to be used for generation error log. |
| -M,--Module <M> | Specify module name and version to be generated code for. |
| -O,--Output <O> | Project-relative path to location where the generated code is to be placed. |
| -T,--Top_path <T> | Symbolic parameters to be used for set path of module. |
| -V,--Validate | Symbolic parameters to be used for invoking validation checks. |

## 7.2 Generator Error Message

*** Common Error**

**ERR254015:** The value for the parameter IoHwAbMcalVendorVersion is empty.

**ERR254009:** Can't find IoHwAbGeneral container.

**ERR254001:** The value for the parameter IoHwAbPolarity in the container IoHwAbPortPin is empty.

**ERR254002:** The value configured for the parameter DioChannelId in the container DioChannel is not valid.

**ERR254003:** The value configured for the parameter IoHwAbHwDioChRef in the container IoHwAbPortPinRef is not valid.

**ERR254005:** The value configured for the parameter PortPinSymbolicName in the container PortPin is not valid.

**ERR254006:** The value configured for the parameter IoHwAbHwPortPinRef in the container IoHwAbPortPinRef is not valid.

**ERR254007:** The value configured for the parameter IoHwAbHwDioChRef in the container IoHwAbPortPinChs should be unique.

**ERR254008:** The value configured for the parameter IoHwAbHwPortPinRefs in the container IoHwAbPortPinChs should be unique.

*** AdcGr**

**ERR254010:** The value configured for the parameter IoHwAbHwAdcGroupRef in the container IoHwAbAdcGroup is not valid.

**ERR254011:** The value configured for the parameter AdcGroupDefinition in the container AdcGroup is not valid.

**ERR254013:** The value configured for the parameter IoHwAbAdcGroupRef in the container IoHwAbAdcGroups should be unique.

*** AdcAllGrs**

**ERR254014:** The value configured for the parameter IoHwAbAdcAllGroupRef in the container IoHwAbAdcAllGroups

should have AdcNotification.

* AdcGrInAll

**ERR254016:** The value configured for the parameter IoHwAbHwAdcGroupRef in the container IoHwAbAdcGroupInAll is not valid.

**ERR254017:** The value configured for the parameter AdcGroupDefinition in the referenced container AdcGroup should have only one item.

**ERR254018:** The referenced AdcGroup in the container IoHwAbAdcGroupInAll should have unique AdcGroupDefinition among the IoHwAbAdcGroupInAlls.

**ERR254119:** The value configured for the parameter IoHwAbAdcAllGroupRef in the container IoHwAbAdcGroupInAll should not have AdcNotification for IOManager.

* IoHwAbHwAdcChRefs

**ERR254019:** The value configured for the parameter IoHwAbHwAdcGroupRef in the container IoHwAbAdcGroupInAll should be unique.

**ERR254020:** The value configured for the parameter IoHwAbHwAdcChRef in the container IoHwAbAdcAllGroups should be included in the parameter AdcGroupDefinition which IoHwAbHwAdcAllGroupRef has.

* MC33972

**ERR254021:** The value for the parameter IoHwAbInputScanPeriodInLp in the container IoHwAbMC33972 is empty.

* IoHwAbSpiChRef

**ERR254022:** The value configured for the parameter IoHwAbSpiChRef in the container IoHwAbMC33972 is not valid.

**ERR254023:** The value configured for the parameter IoHwAbSpiSeqRef in the container IoHwAbMC33972 is not valid.

* IoHwAbSpiExtDevice

**ERR254040:** The value configured for the parameter IoHwAbSpiExtDevice in the container IoHwAbMC33972 is not valid.

**ERR254048:** The value configured for the parameter IoHwAbSpiSeqCsGPIO in the container IoHwAbMC33972 is not valid.

* IoHwAbExtIntChRef

**ERR254024:** The referenced IcuChannel uses edge detection. But IcuEdgeDetectApi is set to false.

**ERR254025:** The referenced IcuChannel uses timestamp.But IcuTimestampApi is set to false.

**ERR254026:** The value for the parameter IoHwAbMC33972CallbackViaRte in the container IoHwAbMC33972 set to

true. But there's no notification for that IcuChannel.

**ERR254027:** The value configured for the parameter IoHwAbExtIntChRef in the container IoHwAbMC33972 is not valid.

**ERR254028:** The value for the parameter IoHwAbPinGroup in the container IoHwAbMC33972Pin is empty.

**ERR254029:** The value for the parameter IoHwAbPinBitCarrier in the container IoHwAbMC33972Pin is empty.

**ERR254030:** The value for the parameter IoHwAbPolarity in the container IoHwAbMC33972Pin is empty.

**ERR254031:** The value for the parameter IoHwAbWakeUpInLp in the container IoHwAbMC33972Pin is empty.

**ERR254032:** The value for the parameter IoHwAbWettingCurrentTimer in the container IoHwAbMC33972Pin is empty.

**ERR254033:** The value for the parameter IoHwAbWettingCurrentReg in the container IoHwAbMC33972Pin is empty.

**ERR254034:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbMC33972Pin, IoHwAbPinGroup of which is SP should be unique within the container IoHwAbMC33972.

**ERR254035:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbMC33972Pin, IoHwAbPinGroup of which is SG should be unique within the container IoHwAbMC33972.

**ERR254036:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbMC33972Pin, IoHwAbPinGroup of which is SP should be sequential and should start from 〈0〉.

**ERR254037:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbMC33972Pin, IoHwAbPinGroup of which is SG should be sequential and should start from 〈0〉.

*** L9826**

**ERR254038:** The value for the parameter IoHwAbUseDiag in the container IoHwAbL9826 is empty.

**ERR254039:** The value configured for the parameter IoHwAbSpiChRef in the container IoHwAbL9826 is not valid.

*** IoHwAbSpiSeqRef**

**ERR254040:** The value configured for the parameter IoHwAbSpiSeqRef in the container IoHwAbL9826 is not valid.

**ERR254040:** The value configured for the parameter IoHwAbSpiExtDevice in the container IoHwAbL9826 is not valid.

**ERR254048:** The value configured for the parameter IoHwAbSpiSeqCsGPIO in the container IoHwAbL9826 is not valid.

*** IoHwAbResetChRef**

**ERR254041:** The value configured for the parameter DioChannelId in the container DioChannel is not valid.

**ERR254042:** The value configured for the parameter IoHwAbResetChRef in the container IoHwAbL9826 is not

valid.

**ERR254043:** The value for the parameter IoHwAbPinBitCarrier in the container IoHwAbL9826Pin is empty.

**ERR254044:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbL9826Pin should be unique within the container IoHwAbL9826.

**ERR254045:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbL9826Pin should be sequential and should start from <0>.

*** L99MC6**

**ERR254039:** The value configured for the parameter IoHwAbSpiChRef in the container IoHwAbL99MC6 is not valid.

*** IoHwAbSpiSeqRef**

**ERR254040:** The value configured for the parameter IoHwAbSpiSeqRef in the container IoHwAbL99MC6 is not valid.

*** IoHwAbSpiExtDevice**

**ERR254040:** The value configured for the parameter IoHwAbSpiExtDevice in the container IoHwAbL99MC6 is not valid.

**ERR254048:** The value configured for the parameter IoHwAbSpiSeqCsGPIO in the container IoHwAbL99MC6 is not valid.

**ERR254043:** The value for the parameter IoHwAbPinBitCarrier in the container IoHwAbL99MC6Pin is empty.

**ERR254044:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbL99MC6Pin should be unique within the container IoHwAbL99MC6.

**ERR254045:** The value configured for the parameter IoHwAbPinBitCarrier in the container IoHwAbL99MC6Pin should be sequential and should start from <0>.

*** IoHwAbConfig**

**ERR254012:** Can't find IoHwAbConfig container.

*** UseDigDir**

**ERR254046:** The value configured for the parameter IoHwAbPortPinChRef in the container IoHwAbDigitalDirectLogical is not valid.

*** UseAnaInDir**

**ERR254047:** The value for the parameter AdcEnableStartStopGroupApi in the container AdcGeneral should be true.

**ERR254049:** The value configured for the parameter IoHwAbAdcGroupRef in the container

IoHwAbAnalogInputDirectLogical is not valid.

**ERR254110:** The value configured for the parameter IoHwAbUseAnalogInputDirect is set to true. But there is no instance of the container IoHwAbAnalogInputDirectLogical.

*** UseIcu**

**ERR254050:** The referenced IcuChannel uses edge detection. But IcuEdgeDetectApi is set to false.

**ERR254051:** The referenced IcuChannel uses timestamp. But IcuTimestampApi is set to false.

**ERR254052:** The value for the parameter IoHwAbIcuCallbackViaRte in the container IoHwAbIcuLogical set to true. But there's no notification for that IcuChannel.

**ERR254053:** The value configured for the parameter IoHwAbHwIcuChRef in the container IoHwAbIcuLogical is not valid.

*** UseGpt**

**ERR254054:** The value for the parameter IoHwAbGptCallbackViaRte in the container IoHwAbGptLogical is empty.

**ERR254055:** The value for the parameter IoHwAbGptCallbackViaRte in the container IoHwAbGptLogical set to true. But there's no notification for that GptChannelConfiguration.

**ERR254056:** The value configured for the parameter IoHwAbHwGptChRef in the container IoHwAbGptLogical is not valid.

**ERR254153:** The value for the Gpt_Ticks_for_1us should not smaller than 1. Change the prescale value

*** UsePwm**

**ERR254057:** The value for the parameter IoHwAbPwmCallbackViaRte in the container IoHwAbPwmLogical is empty.

**ERR254058:** The value for the parameter IoHwAbPwmCallbackViaRte in the container IoHwAbPwmLogical set to true. But there's no notification for that PwmChannel.

**ERR254059:** The value configured for the parameter IoHwAbHwPwmChRef in the container IoHwAbPwmLogical is not valid.

*** UseIOManager**

**ERR254060:** There is no instance for the container IoHwAbIOMTimer.

**ERR254061:** There should be only one referenced timer for IoHwAbIOMTimer.

**ERR254062:** The referenced timer for the IoHwAbIOMTimer is not valid.

**ERR254063:** The value configured for the parameter IoHwAbTaskFG1Ref in the container IoHwAbIOManager is not valid.

**ERR254064:** The value configured for the parameter IoHwAbTaskFG2Ref in the container IoHwAbIOManager is not

valid.

* UseAnaIn

**ERR254067:** The value for the parameter AdcGrpNotifCapability in the container AdcGeneral should be true.

**ERR254069:** The value for the parameter IoHwAbDirectAccess in the container IoHwAbAnlogInputLogical is empty.

**ERR254070:** The value for the parameter IoHwAbDefaultValue in the container IoHwAbAnlogInputLogical is empty.

**ERR254071:** The value for the parameter IoHwAbFilterConstant in the container IoHwAbAnlogInputLogical is empty.

**ERR254152:** IoHwAbAnalogInput DirectAccess option set as True and Adc Hw Channel associated in IoHwAbAnalogInput and IoHwAbAnalogInputDirect are same.
DirectAccess option must be set to False. Otherwise, Remove the conflict(Assign different ADC HW channel).

* IoHwAbAdcGroupRef

**ERR254072:** The value configured for the parameter IoHwAbAdcGroupRef in the container IoHwAbAnalogInputLogical is not valid.

* UseDigIn

**ERR254073:** The value for the parameter IoHwAbSamplePeriod in the container IoHwAbDigitalInputLogical is empty.

**ERR254074:** The value for the parameter IoHwAbDebounceH2L in the container IoHwAbDigitalInputLogical is empty.

**ERR254075:** The value for the parameter IoHwAbDebounceL2H in the container IoHwAbDigitalInputLogical is empty.

**ERR254076:** The value for the parameter IoHwAbDirectAccess in the container IoHwAbDigitalInputLogical is empty.

**ERR254077:** The value for the parameter IoHwAbLowPower in the container IoHwAbDigitalInputLogical is empty.

**ERR254078:** One channel reference should be configured in the container IoHwAbDigitalInputLogical.

**ERR254079:** Only one channel reference configuration is allowed in the container IoHwAbDigitalInputLogical.

**ERR254080:** The value configured for the parameter IoHwAbPortPinChRef in the container IoHwAbDigitalInputLogical is not valid.

**ERR254081:** The value configured for the parameter IoHwAbMC33972PinRef in the container IoHwAbDigitalInputLogical is not valid.

**ERR254082:** The container IoHwAbDigitalInputLogical has reference to IoHwAbMC33972Pin.
Then allowed value for the parameter IoHwAbLowPower is only 'false'.

**ERR254083:** The container IoHwAbDigitalInputLogical has reference to IoHwAbMC33972Pin. Then allowed value for the parameter IoHwAbSamplePeriod is only 'Slow'.

**ERR254086:** The value configured for the parameter Refs in the container IoHwAbDigitalInputLogical should not be unique.

**ERR254087:** The value configured for the parameter IoHwAbPortPinChRef in the container IoHwAbDigitalInputLogical should not be configured in the container IoHwAbDigitalDirectLogical. Duplicate IoHwAbPortPinChRef

*** UseDigOut**

**ERR254088:** The value for the parameter IoHwAbDefaultValue in the container IoHwAbDigitalOutputLogical is empty.

**ERR254089:** The value for the parameter IoHwAbDirectAccess in the container IoHwAbDigitalOutputLogical is empty.

**ERR254090:** One channel reference should be configured in the container IoHwAbDigitalOutputLogical.

**ERR254091:** Only one channel reference configuration is allowed in the container IoHwAbDigitalOutputLogical.

**ERR254092:** The value configured for the parameter IoHwAbPortPinChRef in the container IoHwAbDigitalOutputLogical is not valid.

**ERR254093:** The value configured for the parameter IoHwAbL9826PinRef in the container IoHwAbDigitalOutputLogical is not valid.

**ERR254109:** The container IoHwAbDigitalOutputLogical not reference to IoHwAbPortPinChRef. Then allowed value for the parameter IoHwAbDcmEnable is only 'false'

*** IoHwAbL99MC6PinRef**

**ERR254093:** The value configured for the parameter IoHwAbL99MC6PinRef in the container IoHwAbDigitalOutputLogical is not valid.

**ERR254094:** The value configured for the parameter Refs in the container IoHwAbDigitalOutputLogical should not be unique.

**ERR254095:** The value configured for the parameter IoHwAbPortPinChRef in the container IoHwAbDigitalOutputLogical should not be configured in the container IoHwAbDigitalDirectLogical. Duplicate IoHwAbPortPinChRef.

*** UseInSupSwt**

**ERR254097:** The value for the parameter IoHwAbDigitalSupllySwitchDelay in the container

IoHwAbDigitalSupplySwitch is not valid.

**ERR254098:** The value configured for the parameter IoHwAbUseDigitalSupplySwitchControlInApp is set to true.Then there should be configured for the parameters IoHwAbDigitalSupplySwitchInitMode.

**ERR254099:** The value configured for the parameter IoHwAbDigitalSupplySwitchPortPinChRef in the container IoHwAbDigitalSupplySwitchPin is not valid.

**ERR254100:** The value configured for the parameter IoHwAbUseDigitalSupplySwitch is set to true. But there is no instance of the container IoHwAbDigitalSupplySwitch.

**ERR254101**: The value for the parameter IoHwAbAnalogSupllySwitchDelay in the container IoHwAbAnalogSupplySwitch is empty.

**ERR254102:** The value configured for the parameter IoHwAbAnalogSupplySwitchPortPinChRef in the container IoHwAbAnalogSupplySwitchPin is not valid.

**ERR254103:** The value configured for the parameter IoHwAbUseAnalogSupplySwitch is set to true. But there is no instance of the container IoHwAbAnalogSupplySwitch.

*** UseVolMon**

**ERR254105:** The value for the parameter IoHwAbVoltageMonHysteresis in the container IoHwAbVoltageMonitoring is empty.

**ERR254106:** The value for the parameter IoHwAbVoltageMonDefaultValue in the container IoHwAbVoltageMonitoring is empty.

**ERR254107:** The value for the parameter IoHwAbVoltageMonFilter in the container IoHwAbVoltageMonitoring is empty.

**ERR254108:** The value configured for the parameter IoHwAbVoltageMonAdcGroupRef in the container IoHwAbVoltageMonitoring is not valid.

*** IoHwAbDemEventParameterRefs**

**ERR254066:** The value configured for the parameter ‘ParameterName’ is empty.

## 7.3 Warning Messages

*** Common Warning**

**WRN254027:** API IsInput and IsOutput (IoHwAb_If_DigDir) return always false if the user does not set PortPinDirection to PORT_PIN_IN or PORT_PIN_OUT.

*** IoHwAbSpiExtDevice**

**WRN254025:** The value configured for the parameter IoHwAbSpiCsGPIO is ignored because CS is handled by peripheral engine.

*** IoHwAbExtIntChRef**

**WRN254001:** The value for the parameter IoHwAbExtIntChRef in the container IoHwAbMC33972 is empty ButThe value for the parameter IoHwAbMC33972CbkViaRte is set to true. This will be ignored.

**WRN254002:** The configured value of IoHwAbPinGroup is 'SG' in the container IoHwAbMC33972Pin. Then allowed value for the parameter IoHwAbPolarity is only 'LowActive'. Other values are ignored.

*** IoHwAbSpiSeqRef**

**WRN254025:** The value configured for the parameter IoHwAbSpiCsGPIO is ignored because CS is handled by peripheral engine.

*** IoHwAbResetChRef**

**WRN254003:** The value configured for the parameter IoHwAbParallelMode in the container IoHwAbL9826Pin is valid only if its PinBitCarrier is 3 or 7.

*** IoHwAbSpiExtDevice**

**WRN254025:** The value configured for the parameter IoHwAbSpiCsGPIO is ignored because CS is handled by peripheral engine.

*** UseDigDir**

**WRN254004:** The value configured for the parameter IoHwAbUseDigitalDirect is set to true. But there is no instance of the container IoHwAbDigitalDirectLogical.

*** UseIcu**

**WRN254006:** The value configured for the parameter IoHwAbUseIcu is set to true. But there is no instance of the container IoHwAbIcuLogical.

*** UseGpt**

**WRN254007:** The value configured for the parameter IoHwAbUseGpt is set to true. But there is no instance of the container IoHwAbGptLogical.

**WRN254026:** The value of McuFrequency is not matched with calculated frequency. It should be XXX

*** UsePwm**

**WRN254008:** The value configured for the parameter IoHwAbUsePwm is set to true. But there is no instance of the container IoHwAbPwmLogical.

*** IoHwAbAdcGroupRef**

**WRN254009:** The value configured for the parameter IoHwAbAdcGroupRef in the container

IoHwAbAnalogInputLogical should not be configured in the container IoHwAbAnalogDirectLogical. Duplicate IoHwAbAdcGroupRef.

**WRN254010:** The value configured for the parameter IoHwAbUseAnalogInput is set to true. But there is no instance of the container IoHwAbAnalogInputLogical.

*** UseDigIn**

**WRN254011:** The referenced PortPinChRef should have the value PORT_PIN_IN for the parameter PortPinDirection.

**WRN254012:** The container IoHwAbDigitalInputLogical has reference to IoHwAbMC33972Pin. Then allowed value for the parameter IoHwAbDirectAccess is only 'false'. Other values are ignored.

**WRN254013:** The value configured for the parameter IoHwAbUseDigitalInput is set to true. But there is no instance of the container IoHwAbDigitalInputLogical.

*** UseDigOut**

**WRN254014:** The referenced PortPinChRef should have the value PORT_PIN_OUT for the parameter PortPinDirection.

**WRN254015:** The container IoHwAbDigitalOutputLogical has reference to IoHwAbL9826Pin. Then allowed value for the parameter IoHwAbDirectAccess is only 'false'. Other values are ignored.

*** IoHwAbL99MC6PinRef**

**WRN254015A:** The container IoHwAbDigitalOutputLogical has reference to IoHwAbL99MC6Pin. Then allowed value for the parameter IoHwAbDirectAccess is only 'false'. Other values are ignored.

**WRN254016:** The value configured for the parameter IoHwAbUseDigitalOutput is set to true. But there is no instance of the container IoHwAbDigitalOutputLogical.

*** UseInSupSwt**

**WRN254017:** The value configured for the parameter IoHwAbUseDigitalSupplySwitch is set to true. ButThe value configured for the parameter IoHwAbUseDigitalInput doesn't exist or is set to false. IoHwAbUseDigitalSupplySwitch will be ignored.

**WRN254021:** The value configured for the parameter IoHwAbUseDigitalSupplySwitchLP is set to true. ButThe value configured for the parameter BswMGenericLowPowerRequestEnabled of BswM module doesn't exist or is set to false.

**WRN254018:** The value configured for the parameter IoHwAbUseDigitalSupplySwitchControlInApp is set to true. But there is no instance of the Container IoHwAbDigitalSupplySwitchPin.

**WRN254019:** The value configured for the parameter IoHwAbUseAnalogSupplySwitch is set to true. But the value

configured for the parameter IoHwAbUseAnalogInput doesn't exist or is set to false. IoHwAbUseAnalogSupplySwitch will be ignored.

**WRN254020:** The value configured for the parameter IoHwAbUseAnalogSupplySwitchControlInApp is set to true. But there is no instance of the Container IoHwAbAnalogSupplySwitchPin.

**WRN254023:** The value configured for the parameter IoHwAbUseInputSupplySwitch is set to true. But there is no instance of the container IoHwAbInputSupplySwitch.

*** UseVolMon**

**WRN25424:** The value configured for the parameter IoHwAbUseVoltageMonitoring is set to true. But there is no instance of the container IoHwAbVoltageMonitoring.

## 7.4 Information Messages

None

# 8. Appendix

None