User Manual

for S32K1 ADC Driver

Document Number: UM2ADCASR4.4 Rev0000R1.0.1 Rev. 1.0

Chapter 1

Revision History

Revision	Date	Author	Description
1.0	24.02.2022	NXP RTD Team	Prepared for release RTD S32K1 Version 1.0.1

Chapter 2

Introduction

This User Manual describes NXP Semiconductor AUTOSAR ADC for S32K1XX. AUTOSAR ADC driver configuration parameters and deviations from the specification are described in Driver chapter of this document. AUTOSAR ADC driver requirements and APIs are described in the AUTOSAR ADC driver software specification document.

2.1 Supported Derivatives

The software described in this document is intended to be used with the following microcontroller devices of NXP Semiconductors:

- s32k116_qfn32
- s32k116_lqfp48
- s32k118_lqfp48
- s32k118_lqfp64
- s32k142_lqfp48
- s32k142_lqfp64
- s32k142_lqfp100
- s32k142w_lqfp48
- s32k142w_lqfp64
- s32k144_lqfp48

- s32k144_lqfp64
- s32k144_lqfp100
- s32k144_mapbga100
- s32k144w_lqfp48
- s32k144w_lqfp64
- s32k146_lqfp64
- s32k146_lqfp100
- s32k146_mapbga100
- s32k146_lqfp144
- s32k148_lqfp100
- s32k148_mapbga100
- s32k148_lqfp144
- s32k148_lqfp176

All of the above microcontroller devices are collectively named as S32K1.

2.2 Overview

AUTOSAR (AUTomotive Open System ARchitecture) is an industry partnership working to establish standards for software interfaces and software modules for automobile electronic control systems.

AUTOSAR:

- paves the way for innovative electronic systems that further improve performance, safety and environmental friendliness.
- is a strong global partnership that creates one common standard: "Cooperate on standards, compete on implementation".
- is a key enabling technology to manage the growing electrics/electronics complexity. It aims to be prepared for the upcoming technologies and to improve cost-efficiency without making any compromise with respect to quality.
- facilitates the exchange and update of software and hardware over the service life of the vehicle.

2.3 About This Manual

This Technical Reference employs the following typographical conventions:

- **Boldface** style: Used for important terms, notes and warnings.
- *Italic* style: Used for code snippets in the text. Note that C language modifiers such "const" or "volatile" are sometimes omitted to improve readability of the presented code.

Notes and warnings are shown as below:

Note

This is a note.

Warning

This is a warning

2.4 Acronyms and Definitions

Term	Definition
ADC	Analog to Digital Converter
API	Application Programming Interface
ASM	Assembler
C/CPP	C and C++ Source Code
CS	Chip Select
DEM	Diagnostic Event Manager
DET	Development Error Tracer
DMA	Direct Memory Access
ECU	Electronic Control Unit
FIFO	First In First Out
LSB	Least Signifigant Bit
MCU	Micro Controller Unit
MSB	Most Significant Bit
N/A	Not Applicable
PDB	Programmable Delay Block
RAM	Random Access Memory
SIM	System Integration Module
SIU	Systems Integration Unit
SWS	Software Specification
XML	Extensible Markup Language

2.5 Reference List

#	Title	Version
1	Specification of ADC Driver	AUTOSAR Release 4.↩ 4.0
2	S32K1xx Series Reference Manual	Rev. 14, 09/2021
3	S32K1xx Data Sheet	Rev. 14, 08/2021
4	Errata S32K116 (0N96V)	Rev. 22/OCT/2021
5	Errata S32K118 (0N97V)	Rev. 22/OCT/2021
6	Errata S32K142 (0N33V)	Rev. 22/OCT/2021
7	Errata S32K144 (0N57U)	Rev. 22/OCT/2021
8	Errata S32K144W (0P64A)	Rev. 22/OCT/2021
9	Errata S32K146 (0N73V)	Rev. 22/OCT/2021
10	Errata S32K148 (0N20V)	Rev. 22/OCT/2021

Chapter 3

Driver

3.1 Requirements

Requirements for this driver are detailed in the Autosar Driver Software Specification document (See Table Reference List).

It has vendor-specific requirements and implementation.

3.2 Driver Design Summary

The ADC Driver initializes and controls the internal Analog to Digital Converter Unit(s) of the microcontroller. It provides services to start and stop a conversion respectively to enable and disable the trigger source for a conversion. Furthermore it provides services to enable and disable a notification mechanism and routines to query the status and result of a conversion. The ADC Driver shall work on so called ADC channels. An ADC channel combines an analog input pin, the needed ADC circuitry itself and a conversion result register into an entity that can be individually controlled and accessed via the ADC Driver. The driver provides a service for Streaming management results and for De-Initialization of circuits.

3.3 Hardware Resources

This device provides two General-purpose ADC :ADC HW Unit 0 (ADC0), ADC HW Unit 1 (ADC1, only available on S32K14X devices). The number of ADC hardware units and channels are derivative specific, so please consult the reference manual.

3.4 Deviations from Requirements

The driver deviates from the AUTOSAR ADC Driver software specification in some places. The table identifies the AUTOSAR requirements that are not fully implemented, implemented differently, not available, not testable or out of scope for the ADC Driver.

Term	Definition
N/S	Out of scope
N/I	Not implemented
N/F	Not fully implemented

Below table identifies the AUTOSAR requirements that are not fully implemented, not implemented or out of scope for the driver.

Requirement	Status	Description	Notes
SWS_Adc_00082	N/F	Service name: - IoHwAb_Adc↩ Notification - Syntax: - void IoHwAb_Adc↩ Notification(void) - Sync/Async: - Synchronous - Reentrancy: - Non Reentrant - Parameters (in): - None - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - Will be called by the ADC Driver when a group conversion is completed for group . - Available via: - IoHwAb_Adc.h	"IoHwAb_AdcNotification<#groupI↩ D>" is not fully implemented, because callback notification with this prototype can be configured per group, according with SWS_Adc_00084 and also in agreement with this statement from the 'Specification of ADC Driver AUTOSAR 4.4.0': "In this chapter all interfaces are listed where the target function could be configured. The target function is usually a call-back function. The names of this kind of interfaces are not fixed because they are configurable."
SWS_Adc_00337	N/S	The hardware prioritization mechanism shall be used in case of hardware triggered conversion requests.	HW prioritization mechanism is not available on platform.
SWS_Adc_00339	N/S	If hardware priority mechanism is supported and selected: The ADC module shall allow the mapping of the configured priority levels (0-255) to the available hardware priority levels.	HW prioritization mechanism is not available on platform.

Requirement	Status	Description	Notes
SWS_Adc_00341	N/S	If the priority mechanism is supported by the hardware: The ADC module shall support the static configuration option ADC_PRIORITY_HW to enable the priority mechanism using only the hardware priority mechanism.	HW prioritization mechanism is not available on platform.
SWS_Adc_00345	N/S	The ADC module's priority mechanism shall allow suspending and resuming of channel group conversions.	Only abort/restart is supported.
SWS_Adc_00429	N/S	The function Adc_DisableHardware↩ Trigger shall remove any queued start/restart request for the requested ADC Channel group if queuing is enabled.	Not applicable to platforms that do not support queuing hardware triggers.
SWS_Adc_00460	N/S	These requirements are not applicable to this specification.	Not a requirement.
SWS_Adc_00475	N/S	Service name: Adc_SetPowerState Syntax: Std_ReturnType Adc_↩ SetPowerState(Adc_PowerState↩ RequestResultType∗ Result) Service ID[hex]: 0x10 Sync/Async: Synchronous Reentrancy: Non Reentrant Parameters (in): None Parameters (inout): None Parameters (out): Result If the API returns E_OK: ADC_SERVICE↩ _ACCEPTED: Power state change executed. If the API returns E_↩ NOT_OK: ADC_NOT_INIT: ADC Module not initialized. ADC_SE↩ QUENCE_ERROR: wrong API call sequence. ADC_HW_FAILURE: the HW module has a failure which prevents it to enter the required power state. Return value: Std_ReturnType E_OK: Power Mode changed E_NO↩ T_OK: request rejected Description: This API configures the Adc module so that it enters the already prepared power state, chosen between a predefined set of configured ones.	S32K1XX Hardware does not support this feature

Requirement	Status	Description	Notes
SWS_Adc_00476	N/S	Service name: Adc_GetCurrentPowerState Syntax: Std_ReturnType Adc_GetCurrentPowerState(Adc_PowerStateType* CurrentPowerState, Adc_PowerStateRequestResultType* Result) Service ID[hex]: 0x11 Sync/Async: Synchronous Reentrancy: Non Reentrant Parameters (in): None Parameters (inout): None Parameters (out): CurrentPowerState The current power mode of the ADC HW Unit is returned in this parameter Result If the API returns E_OK: ADC_SERVICE_ACCEPTED: Current power mode was returned. If the API returns E_NOT_OK: ADC_NOT_INIT: ADC Module not initialized. Return value: Std_ReturnType E_OK: Mode could be read E_NOT_OK: Service is rejected Description: This API returns the current power state of the ADC HW unit.	S32K1XX Hardware does not support this feature.
SWS_Adc_00477	N/S	Service name: Adc_GetTargetPowerState Syntax: Std_ReturnType Adc_GetTargetPowerState(Adc_PowerStateType* TargetPowerState, Adc_PowerStateRequestResultType* Result) Service ID[hex]: 0x12 Sync/Async: Synchronous Reentrancy: Non Reentrant Parameters (in): None Parameters (inout): None Parameters (out): TargetPowerState The Target power mode of the ADC HW Unit is returned in this parameter Result If the API returns E_OK: ADC_SERVICE_ACCEPTED:Target power mode was returned. If the API returns E_NOT_OK: ADC_NOT_INIT: ADC Module not initialized. Return value: Std_ReturnType E_OK: Mode could be read E_NOT_OK: Service is rejected Description: This API returns the Target power state of the ADC HW unit.	S32K1XX Hardware does not support this feature.

Requirement	Status	Description	Notes
SWS_Adc_00478	N/S	Service name: Adc_PreparePower↩ State Syntax: Std_ReturnType Adc_↩ PreparePowerState(Adc_PowerState↩ Type PowerState, Adc_PowerState↩ RequestResultType* Result) Service ID[hex]: 0x13 Sync/Async: Synchronous Reentrancy: Non Reentrant Parameters (in): PowerState The target power state intended to be attained Parameters (inout): None Parameters (out): Result If the API returns E_OK: ADC_SERVICE_A↩ CCEPTED: ADC Module power state preparation was started. If the API returns E_NOT_OK: ADC_NOT↩ _INIT: ADC Module not initialized. ADC_SEQUENCE_ERROR: wrong API call sequence (Current Power State = Target Power State). AD↩ C_POWER_STATE_NOT_SUPP: ADC Module does not support the requested power state. ADC_TRA↩ NS_NOT_POSSIBLE: ADC Module cannot transition directly from the current power state to the requested power state or the HW peripheral is still busy. Return value: Std_ReturnType E↩ _OK: Preparation process started E_NOT_OK: Service is rejected Description: This API starts the needed process to allow the ADC HW module to enter the requested power state	S32K1XX Hardware does not support this feature.
SWS_Adc_00479	N/S	Service name: - Adc_Main_Power↩ TransitionManager - Syntax: - void Adc_Main_Power↩ TransitionManager (void) - Service ID[hex]: - 0x14 - Description: - This API is cyclically called and supervises the power state transitions, checking for the readiness of the module and issuing the callbacks IoHwAb_Adc_Notify↩ ReadyForPowerState (see AdcPower↩ StateReadyCbkRef configuration parameter). - Available via: - SchM_Adc.h -	Asynchronous Power State transition mode is not needed. It's not supported by hardware but still available in driver design and code (without any functionalities) since it's an Autosar API.

Requirement	Status	Description	Notes
SWS_Adc_00480	N/S	Service name: - IoHwAb_Adc_↩ NotifyReadyForPowerState - Syntax: - void IoHwAb_Adc_Notify↩ ReadyForPowerState(void) - Sync/Async: - Synchronous - Reentrancy: - Non Reentrant - Parameters (in): - None - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - The API shall be invoked by the ADC Driver when the requested power state preparation for mode is completed. - Available via: - IoHwAb_Adc.h -	Asynchronous Power State transition mode is not needed. It's not supported by hardware but still available in driver design and code (without any functionalities) since it's an Autosar API.
SWS_Adc_00481	N/S	The API configures the HW in order to enter the previously prepared Power State. All preliminary actions to enable this transition (e.g. setting all channels in IDLE status, de-registering of all notifications and so on) must already have been taken by the responsible SWCs (e.g. IoHwAbs). The API shall not execute preliminary, implicit power state changes (i.e. if a requested power state is not reachable starting from the current one, no intermediate power state change shall be executed and the request shall be rejected).	S32K1XX Hardware does not support this feature.
SWS_Adc_00482	N/S	In case the target power state is the same as the current one, no action is executed and the API returns immediately with an E_OK result.	S32K1XX Hardware does not support this feature.
SWS_Adc_00483	N/S	In case the normal Power State is requested, the API shall refer to the necessary parameters contained in the same containers used by Adc_Init.	S32K1XX Hardware does not support this feature.
SWS_Adc_00484	N/S	For the other power states, only power state transition specific reconfigurations shall be executed in the context of this API (i.e. the API cannot be used to apply a completely new configuration to the Adc module). Any other re-configuration not strictly related to the power state transition shall not take place.	S32K1XX Hardware does not support this feature.

Requirement	Status	Description	Notes
SWS_Adc_00485	N/S	The API shall refer to the configuration container related to the required Power State in order to derive some specific features of the state (e.g support of Power States).	S32K1XX Hardware does not support this feature.
SWS_Adc_00486	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_UNINIT in case this API is called before having initialized the HW unit.	S32K1XX Hardware does not support this feature.
SWS_Adc_00487	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_NOT_DISENGAGED in case this API is called when one or more HW channels (where applicable) are in a state different then IDLE (or similar non-operational states) and/or there are still notification registered for the HW module channels.	S32K1XX Hardware does not support this feature.
SWS_Adc_00488	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_POWER_STATE_NOT_SUPPORTED in case this API is called with an unsupported power state or the peripheral does not support low power states at all.	Adc_SetPowerState does not have the Adc_PowerStateType parameter. This parameter is passed and checked (for unsupported power state) through the AdcPreparePowerState function that is called before calling Adc_SetPowerState function.
SWS_Adc_00489	N/S	The API shall report a runtime error ADC_E_TRANSITION_NOT_POSSIBLE in case the requested power state cannot be directly reached from the current power state.	ADC hardware supports only two power states (full power and low power) and all transitions are valid; there is no need to report ADC_E_TRANSITION_NOT_POSSIBLE error.
SWS_Adc_00490	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_PERIPHERAL_NOT_PREPARED in case the HW unit has not been previously prepared for the target power state by use of the API Adc_PreparePowerState().	S32K1XX Hardware does not support this feature.
SWS_Adc_00491	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_UNINIT in case this API is called before having initialized the HW unit.	S32K1XX Hardware does not support this feature.
SWS_Adc_00492	N/S	The API returns the requested power state of the HW unit. This shall coincide with the current power state if no transition is ongoing.The API is considered to always succeed except in case of HW failures.	S32K1XX Hardware does not support this feature.

Requirement	Status	Description	Notes
SWS_Adc_00493	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_UNINIT in case this API is called before having initialized the HW unit.	S32K1XX Hardware does not support this feature.
SWS_Adc_00494	N/S	This API initiates all actions needed to enable a HW module to enter the target power state.The possibility to operate the periphery depends on the power state and the HW features. These properties should be known to the integrator and the decision whether to use the periphery or not is in his responsibility.	S32K1XX Hardware does not support this feature.
SWS_Adc_00495	N/S	In case the target power state is the same as the current one, no action is executed and the API returns immediately with an E_OK result.The responsibility of the preconditions is left to the environment.	S32K1XX Hardware does not support this feature.
SWS_Adc_00496	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_UNINIT in case this API is called before having initialized the HW unit.	S32K1XX Hardware does not support this feature.
SWS_Adc_00497	N/S	In case development error reporting is activated:The API shall report the DET error ADC_E_POWER_MODE_NOT_SUPPORTED in case this API is called with an unsupported power state is requested or the peripheral does not support low power states at all.	S32K1XX Hardware does not support this feature.
SWS_Adc_00498	N/S	The API shall report a runtime error ADC_E_TRANSITION_NOT_POSSIBLE in case the requested power state cannot be directly reached from the current power state.All asynchronous operation, needed to reach the target power state, can be executed in background in the context of Adc_Main_PowerTransitionManager.	ADC hardware supports only two power states (full power and ow power) and all transitions are valid; there is no need to report ADC_E_TRANSITION_NOT_POSSIBLE error.
SWS_Adc_00499	N/S	This API executes any non-immediate action needed to finalize a power state transition requested by Adc_PreparePowerState().	Asynchronous Power State transition mode is not needed. It's not supported by hardware.
SWS_Adc_00500	N/S	The rate of scheduling shall be defined by Adc MainSchedulePeriod and shall be variable, as the function only needs to be called if a transition has been requested.	Asynchronous Power State transition mode is not needed. It's not supported by hardware.

Requirement	Status	Description	Notes
SWS_Adc_00501	N/S	This API shall also issue callback notifications to the eventually registered users (IoHwAbs) as configured, only in case the asynch mode is chosen.	Asynchronous Power State transition mode is not needed. It's not supported by hardware.
SWS_Adc_00502	N/S	In case the ADC module is not initialized, this function shall simply return without any further elaboration. This is needed to avoid to elaborate uninitialized variables. No DET error shall be entered, because this condition can easily be verified during the startup phase (tasks started before the initialization is complete).Rationale: during the startup phase it can happen that the OS already schedules tasks, which call main functions, while some modules are not initialised yet. This is no real error condition, although need handling, i.e. returning without execution.Although the transition state monitoring functionality is mandatory, the implementation of this API is optional, meaning that if the HW allows for other ways to deliver notification and watch the transition state the implementation of this function can be skipped.	Asynchronous Power State transition mode is not needed. It's not supported by hardware.
SWS_Adc_00526	N/S	Name: - Adc_PowerStateType - Type: - Enumeration - Range: - 1..255 - – - power modes with decreasing power consumptions. - ADC_FULL_POWER - 0 - Full Power - Description: - Power state currently active or set as target power state. - Available via: - Adc.h -	Power management is not available on K1 platform.

Requirement	Status	Description	Notes
SWS_Adc_00527	N/S	Name: - Adc_PowerStateRequest↩ ResultType - Type: - Enumeration - Range: - ADC_SERVICE_ACCEP↩ TED - 0 - Power state change executed. - ADC_NOT_INIT - 1 - ADC Module not initialized. - ADC_SEQUE↩ NCE_ERROR - 2 - Wrong API call sequence. - ADC_HW_FAILURE - 3 - The HW module has a failure which prevents it to enter the required power state. - ADC_POWER_STATE_N↩ OT_SUPP - 4 - ADC Module does not support the requested power state. - ADC_TRANS_NOT_POSSIBLE - 5 - ADC Module cannot transition directly from the current power state to the requested power state or the HW peripheral is still busy. - Description: - Result of the requests related to power state transitions. - Available via: - Adc.h -	Power management is not available on K1 platform.

Requirement	Status	Description	Notes
SWS_Adc_91000	N/S	Service name: - Adc_SetupResult↩ Buffer (draft) - Syntax: - Std_ReturnType Adc↩ _SetupResultBuffer (Adc_GroupType Group, const Adc_ValueGroupType∗ DataBufferPtr) - Service ID[hex]: - 0x0c - Sync/Async: - Asynchronous - Reentrancy: - Reentrant - Parameters (in): - Group - Numeric ID of requested ADC channel group. - DataBufferPtr - pointer to result data buffer - Parameters (inout): - None - Parameters (out): - None - Return value: - Std_ReturnType - E↩ _OK: result buffer pointer initialized correctly E_NOT_OK: operation failed or development error occured - Description: - Initializes ADC driver with the group specific result buffer start address where the conversion results will be stored. The application has to ensure that the application buffer, where DataBufferPtr points to, can hold all the conversion results of the specified group. The initialization with Adc_SetupResultBuffer is required after reset, before a group conversion can be started.Tags: atp.Status=draft - Available via: - Adc.h -	The function is sync instead of async because the multicore implementation is done with type 2 instead of type 4.
SWS_Adc_91001	N/S	Service name: - Adc_Enable↩ HardwareTrigger (draft) - Syntax: - void Adc_EnableHardware↩ Trigger (Adc_GroupType Group) - Service ID[hex]: - 0x05 - Sync/Async: - Asynchronous - Reentrancy: - Reentrant - Parameters (in): - Group - Numeric ID of requested ADC Channel group. - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - Enables the hardware trigger for the requested ADC Channel group.Tags: atp.Status=draft - Available via: - Adc.h -	The function is sync instead of async because the multicore implementation is done with type 2 instead of type 4.

Requirement	Status	Description	Notes
SWS_Adc_91002	N/S	Service name: - Adc_Disable↩ HardwareTrigger (draft) - Syntax: - void Adc_Disable↩ HardwareTrigger (Adc_GroupType Group) - Service ID[hex]: - 0x06 - Sync/Async: - Asynchronous - Reentrancy: - Reentrant - Parameters (in): - Group - Numeric ID of requested ADC Channel group. - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - Disables the hardware trigger for the requested ADC Channel group.Tags: atp.Status=draft - Available via: - Adc.h -	The function is sync instead of async because the multicore implementation is done with type 2 instead of type 4.
SWS_Adc_91003	N/S	Service name: - Adc_EnableGroup↩ Notification (draft) - Syntax: - void Adc_EnableGroup↩ Notification (Adc_GroupType Group) - Service ID[hex]: - 0x07 - Sync/Async: - Asynchronous - Reentrancy: - Reentrant - Parameters (in): - Group - Numeric ID of requested ADC Channel group. - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - Enables the notification mechanism for the requested ADC Channel group.Tags: atp.Status=draft - Available via: - Adc.h -	The function is sync instead of async because the multicore implementation is done with type 2 instead of type 4.

Requirement	Status	Description	Notes
SWS_Adc_91004	N/S	Service name: - Adc_DisableGroup↩ Notification (draft) - Syntax: - void Adc_DisableGroup↩ Notification (Adc_GroupType Group) - Service ID[hex]: - 0x08 - Sync/Async: - Asynchronous - Reentrancy: - Reentrant - Parameters (in): - Group - Numeric ID of requested ADC Channel group. - Parameters (inout): - None - Parameters (out): - None - Return value: - None - Description: - Disables the notification mechanism for the requested ADC Channel group.Tags: atp.Status=draft - Available via: - Adc.h -	The function is sync instead of async because the multicore implementation is done with type 2 instead of type 4.

3.5 Driver Limitations

None.

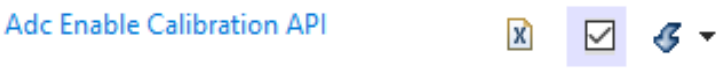
3.6 Driver usage and configuration tips

3.6.1 Calibration function

ADC driver provides Adc_Calibrate() API to eliminate the errors between the actual values and the expected converted values, which might be generated by variations in manufacturing and various runtime environmental effects. The API can be called explicitly by the user at any time after the driver was initialized and while there are no ongoing conversions. Calibration is not automatically started by initialization function.

Configuration-time-prerequisites:

- Enable AdcEnableCalibration in AutosarExt container.



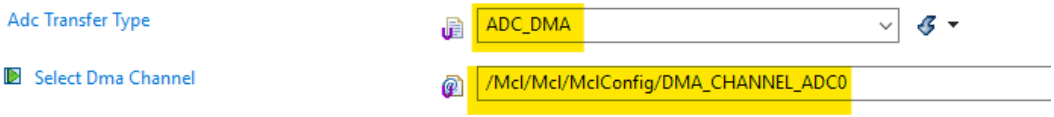
3.6.2 DMA Transfer

ADC driver provides the DMA transfer mechanism for transferring the conversion results directly from data registers to system memory via DMA. This is opposed to Interrupt transfer mode, when ADC driver moves the data from registers to user buffer. This feature can be configured independently for each ADC Hardware Unit. If DMA is used, user cannot run Software and Hardware groups at the same time on a unit because the same DMA channel will be used for both and it cannot handle overwriting the results. The buffer which will record conversion results should be declared within NO_CACHEABLE section.

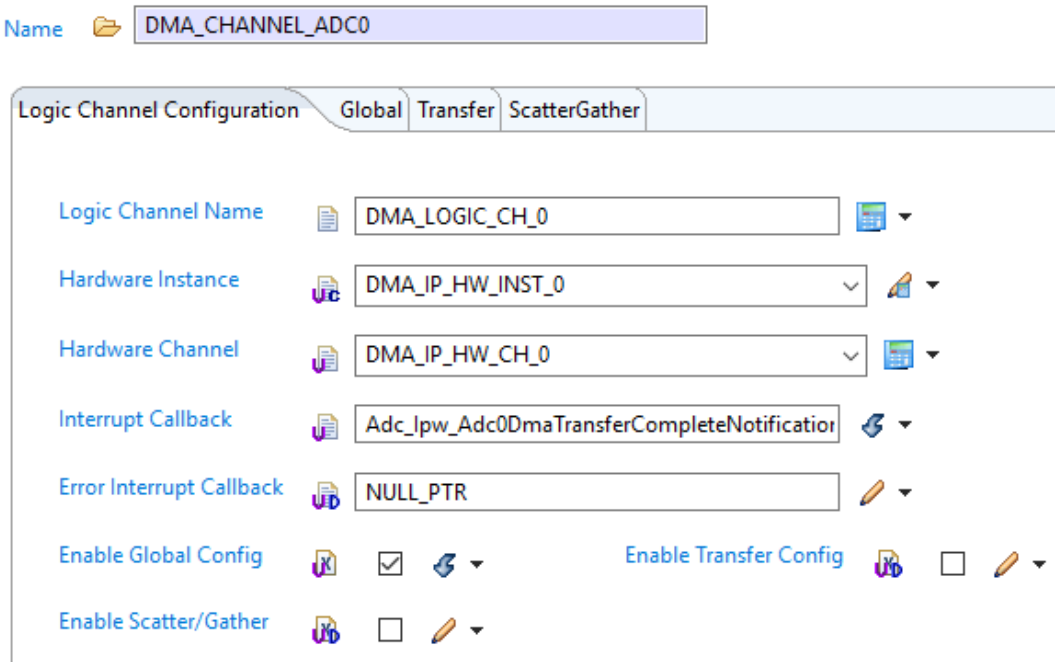
Configuration-time-prerequisites:

- **Adc Global Enable DMA support** needs to be enabled in AutosarExt container:

- Configure **Adc Transfer Type** as ADC_DMA and select DMA Channel that will service the request from ADC in AdcHwUnit container:



- Mcl configuration for the logical channel used for ADC must have Adc_Ipw_AdcXDmaTransferComplete↩ Notification set as interrupt callback (with X defining the ADC instance used, for example Adc_Ipw_Adc0↩ DmaTransferCompleteNotification()), global config must be enabled. The DMA source must be configured as the ADC instance used (Adc_Ip).



Note

- When using **Enable Config Time Support** feature, it is not acceptable to have ADC configured as VariantPreCompile and Mcl configured as VariantPostBuild.
- **Adc Global Enable DMA support** shouldn't be enabled simultaneously with Adc_SetChannel() because there is a risk that DMA TCD (Transfer Control Descriptor) size might be modified at runtime.
- When using DMA, the results transferred are 16-bit wide which includes D field of ADC Data Result Register.

3.6.3 External DMA channel feature

The ADC driver shall support configuring the DMA channel externally by using a boolean parameter named "External Dma Chan Config" at group configuration level. In this mode, ADC driver will only enable/disable the DMA request for the unit. The user must configure the DMA to transfer data according to his needs.

Configuration-time-prerequisites:

- To use the External DMA channel feature, AdcExtDMAChanEnable needs to be enabled in each group container first:

Note

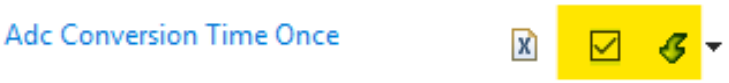
- When External Dma Chan Config is enabled, the driver will not configure any TCDs for DMA
- The user still needs to register Adc_Ipw_Adc0DmaTransferCompleteNotification() as a notification for DMA, but if External Dma Chan Config is enabled for that group, the function only updates the group status and calls the GroupNotification.
- If a group is in Streaming access mode, the code for updating the destination in Adc_Ipw_Adc0DmaTransferCompleteNotification() (i.e. update destination address of TCD, enable DMA hardware request) will not be executed for the group so the update should be handled by the user in the notification of that group.
- If this feature is enabled simultaneously with AdcWithoutInterrupts (Without Interrupts Group), the user is not required to register Adc_Ipw_Adc0DmaTransferCompleteNotification() as a notification for DMA, because the group status is updated when calling Adc_ReadGroup(). It is required for the application to register a result buffer via Adc_SetupResultBuffer(), but the buffer and DMA transfers are completely managed by the application, so the actual buffer is used only by Adc_ReadGroup(). Adc_ReadGroup() assumes that the registered buffer is one dimensional, with number of elements equal to the number of channels in the group and that it stores the latest conversion result (latest sample). This assumption is required to determine if latest conversion has occurred before updating the group status. Additionally, for groups configured with Ext DMA and Without interrupt, the Adc_SetupResultBuffer() resets the buffer to an invalid value so Adc_ReadGroup() can determine if the result has been transferred and status should be updated. Note that if updating the group status is not required, the user can read directly from the DMA destination buffer without calling Adc_ReadGroup().

3.6.4 Conversion Time Once

ADC driver provides Conversion Time Once feature to enable/disable configuring conversion time and averaging settings only when initializing the ADC module. If this feature is enabled, these settings will be done only once in Adc_Init() with values configured per unit, in AdcHwUnit container. If disabled, these settings will be done whenever a group is started, using values from AdcGroup container. When the feature is enabled, the latency of APIs that start group conversions will be reduced. If Adc_SetClockMode() API is also used, the driver allows the user to configure alternate timing settings (for ALTERNATE mode), both at Unit and Group level.

Configuration-time-prerequisites:

- Enable AdcConvTimeOnce in AutosarExt container



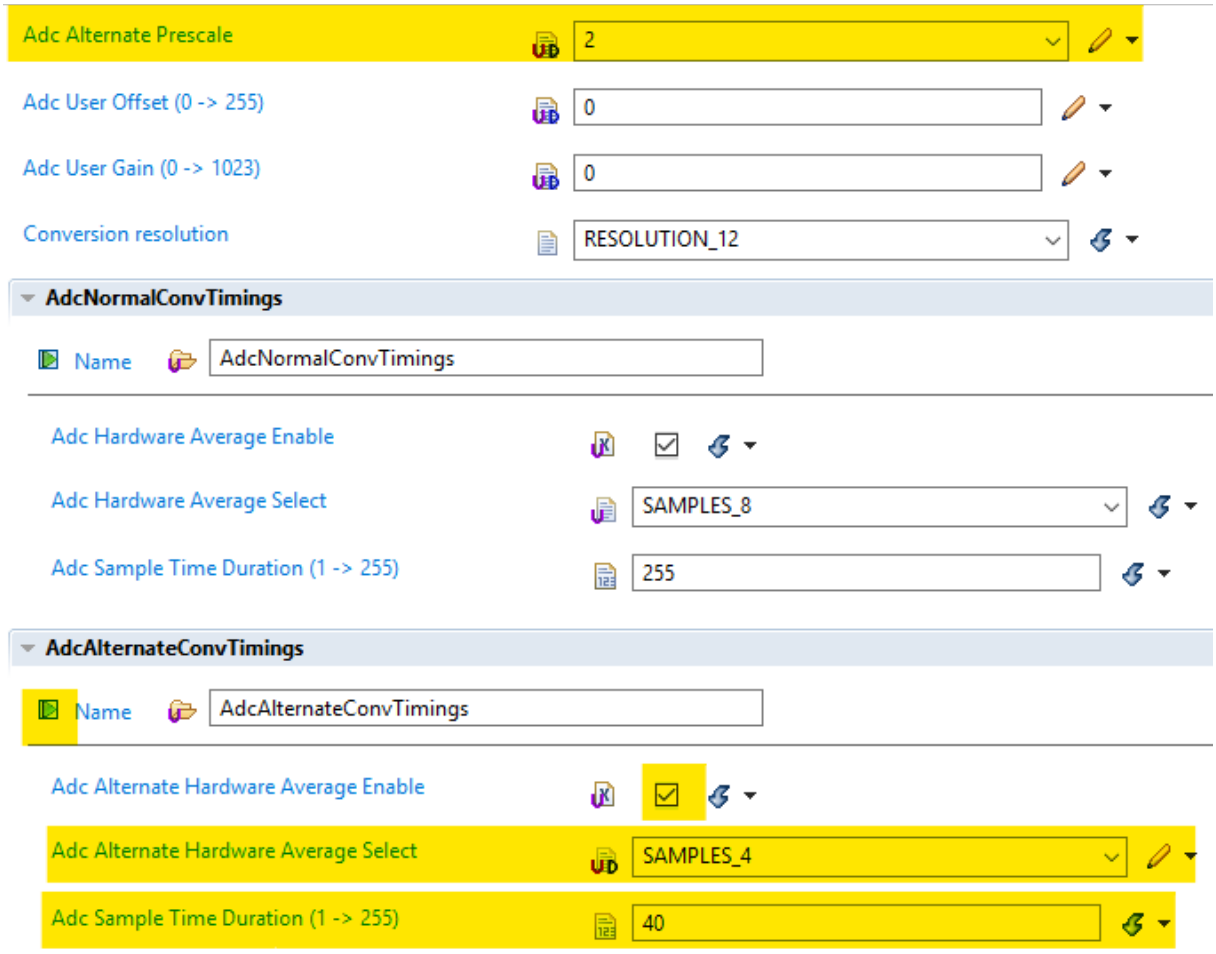
- Configure the values to be used in AdcNormalConvTiming or AdcNormalAlternateTiming (if Adc_SetClockMode() was invoked before with Alternate mode) in AdcHwUnit container

3.6.5 Set Clock Mode

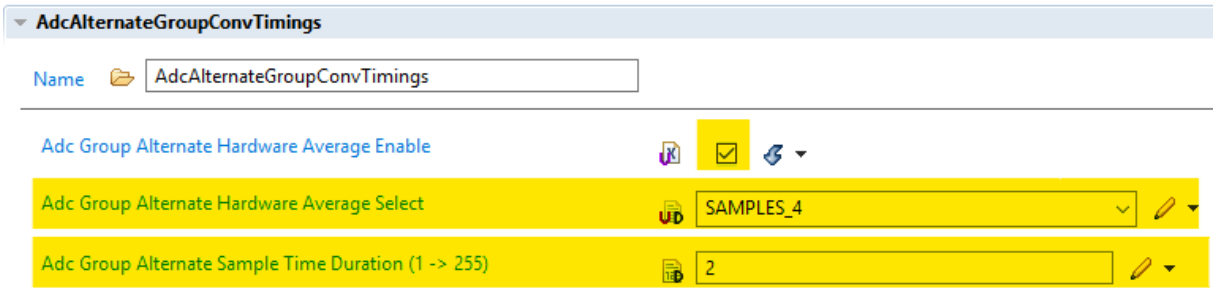
ADC driver provides an optional API Adc_SetClockMode() and configuration parameters to compensate the changes of the input clock of the controlled hardware. By enabling this feature, beside the Normal clock configuration set, user can configure an Alternate clock configuration set and can switch between Normal and Alternate at runtime using Adc_SetClockMode(). One clock configuration set includes the ADC parameters affected by clock configuration, such as: ADC Prescale and Sampling Duration. Configuration-time-prerequisites:

- To use the set clock mode feature, **Adc Set Clock Mode API** needs to be enabled in AutosarExt container first:

- Enable and configure the alternate clock configuration set at HW unit level. If the Conversion Time Once feature is enabled, normal and alternate sampling duration can be configured as well.



- Enable and configure alternate clock configuration set at group level, if Conversion Time Once feature is disabled.



3.6.6 Set Channel Optimization

ADC driver provides an optional configuration parameter that allows the user to change the configuration of a group at runtime. According to Autosar specification, the group definition (list of channels) should be fixed at configuration time; if a different set of channels needs to be converted, another group must be started. However, in some applications stopping the group and starting another takes too long for the given time constraints. For this type of use case, Adc_SetChannel() can be used to quickly change the configuration of a group at runtime: the list of channels, and if applicable on the hardware platform - the set of associated conversion timing information for each channel.

Configuration-time-prerequisites:

- The AdcEnableSetChannel parameter needs to be enabled in AutosarExt container

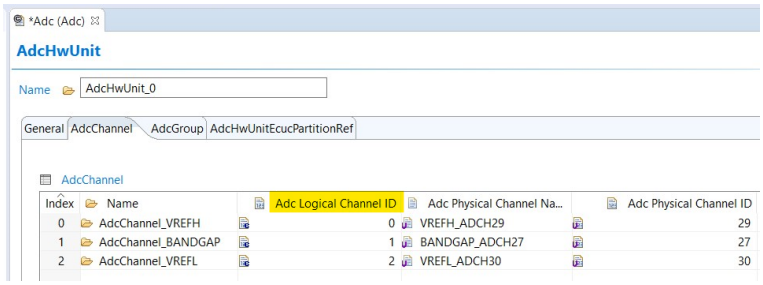
- If channels need to be updated in ISR notification, AdcEnableInitialNotification parameter can be enabled in AutosarExt container

- The initial notification function needs to be enable for each Group where it needs to be used

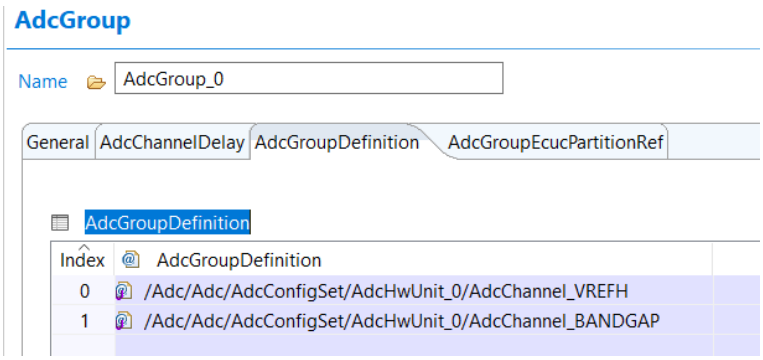
Adc_SetChannel() API can be called by the user application whenever it is needed. In the interrupt routine that handled the conversion complete event, Adc driver will check if Adc_SetChannel() has been called and will update the required hardware registers to match the new configuration. The API can be called from the standard Autosar group conversion complete notification, but this notification has the disadvantage that it's called at the very end of ADC interrupt processing, leaving no time to do the updates in ADC hardware registers. So the very next conversion will not be affected by the changes, but the one after that will be.

Usage:

- With Adc_SetChannel(), configured group channels can be replaced with new list of channels depending on Channel and NumberOfChannel parameters. Element value of Channel paramter is derived from Logical channel ID.



E.g: AdcGroup_0 is configured with 2 Adc channels, when calling Adc_SetChannel(AdcGroup_0, ChanArr, ChanDelay, ChanMask, ChanNum);



- The group channels can be extended to 5 channels (ChanArr[5] = {2, 0, 1, 1, 0} and ChanNum = 5)
- Or can be reduced to only 1 channel (ChanArr[1] = {2} and ChanNum = 1)
- Or position of channels can be changed and number of channels remains (ChanArr[2] = {1, 0} and Chan↩ Num = 2)

For platforms supporting delays, subset of configured channels can be updated by using channel ChanMask. E.g: with AdcGroup_0, channel 1 can be changed to another channel without modifying channel 2 (ChanMask = 0b10; ChanArr[2] = {2, 1} and ChanNum = 2).

Note

- If the Adc_SetChannel() is called before ADC receives the first hardware trigger signal and after calling Adc_EnableHardwareTrigger(), the results of this trigger will not be correct since the new list of channels will be updated in the interrupt of first trigger. To start a conversion with the new list, another signal needs to be provided.
- In case of calling Adc_SetChannel() after Adc_StartGroupConversion(), the list that will be converted depends on total conversion time. If the interrupt event happened before executing Adc_SetChannel(), the old list will be converted. Otherwise, if the total conversion time is longer than the time required to execute both functions (Adc_SetChannel() and Adc_StartGroupConversion()), then the results of the new list will be recorded.
- Sample index will be reset and result data will be overwritten starting from the first sample after runtime channels are updated in ISR.
- The feature AdcEnableInitialNotification can be used by the user application to call Adc_SetChannel() API before ADC driver updates the hardware configuration for the next conversion.

3.6.7 Optimize OneShot HwTrigger Conversions

ADC driver provides a configuration option to enable maximum speed optimizations for conversion processing of ADC groups configured with ADC_CONV_MODE_ONESHOT and ADC_TRIGG_SRC_HW. When this parameter is enabled, no other type of ADC group may be configured.

Configuration-time-prerequisites:

- Enable AdcOptimizeOneShotHwTriggerConversions in AutosarExt container:

Note

Some restrictions are applied when using this feature:

- Only hardware trigger, single access mode groups could be configured.

3.6.8 Without Interrupts Group

ADC driver provides this feature as a mechanism to reduce the CPU load. The basic functionality of ADC driver requires that an interrupt event occurs after each group conversion, during which the software will copy the data from data registers to the user buffer and update the Group status. If Without Interrupts feature is configured, the conversions can run without software intervention (without any interrupt events generated).

Configuration-time-prerequisites:

- Enable AdcWithoutInterrupts for the group using without interrupt feature in AdcGroup container:

For the case of groups configured with ADC_ACCESS_MODE_SINGLE the application can retrieve the results by calling Adc_ReadGroup(). The result buffer configured by user via Adc_SetupResultBuffer() is no longer used to store the results, but must still be registered to avoid raising DET required by AUTOSAR Standard. If HW unit transfer type is configured as INTERRUPT (not with DMA), Adc_ReadGroup() reads the results directly from hardware registers (if the flags indicate that the group conversion was completed) and updates the group state afterwards. If HW unit transfer type is set to DMA, the results are transferred via DMA into an internal buffer. Adc_ReadGroup() reads the results from this buffer and updates the group state afterwards.

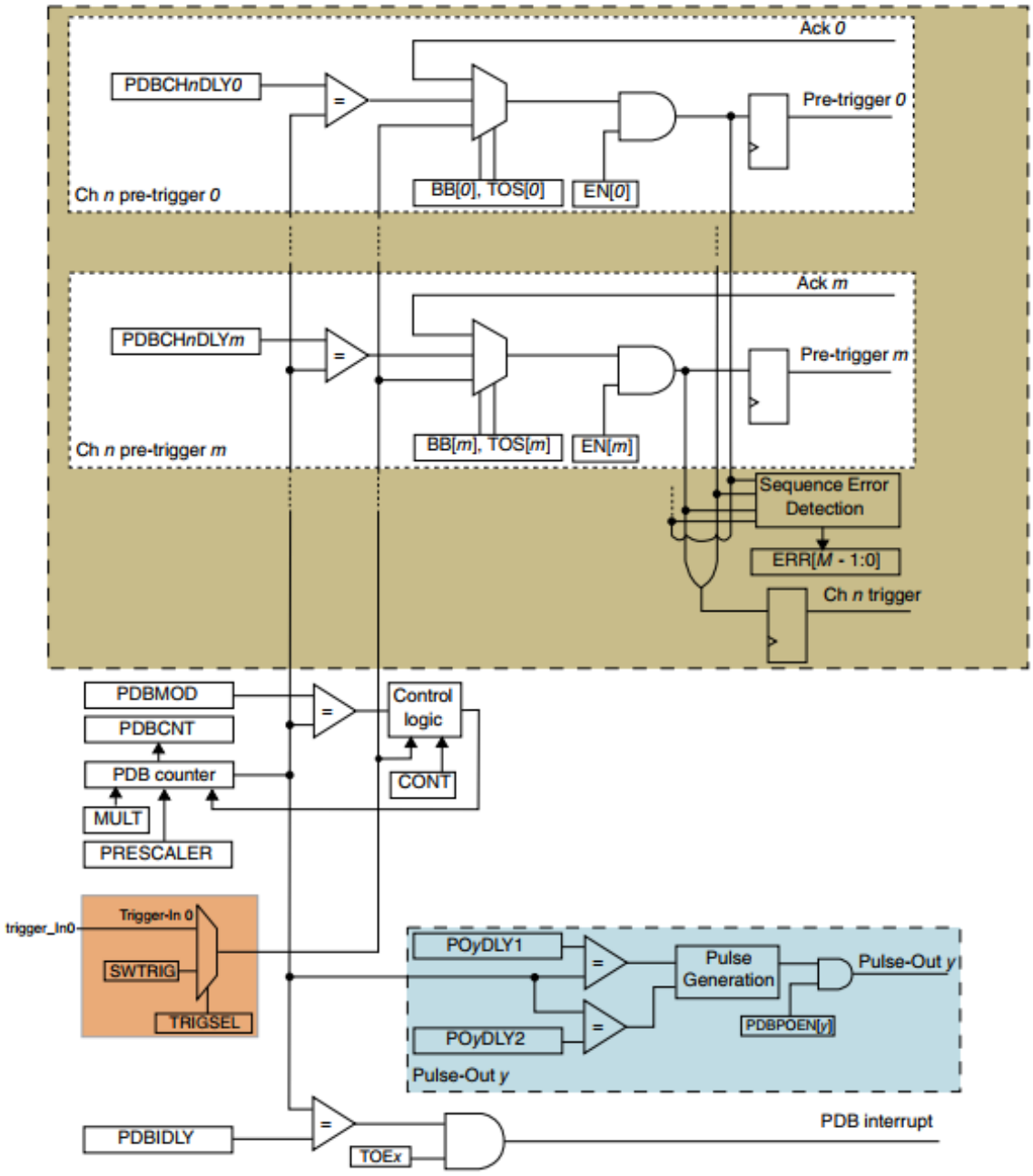
Note

Without Interrupt feature supports only the groups that have number of channels less than maximum SC registers.

3.6.9 Programmable Delay Block (PDB)

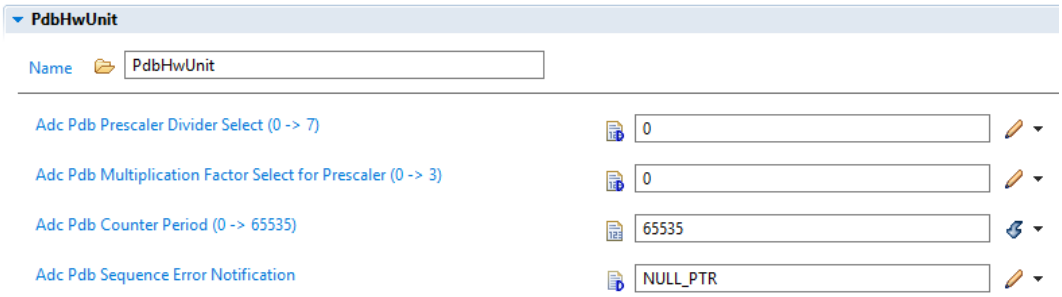
The PDB hardware unit is used to initiate individual channel conversions that are required for each group conversion. Each PDB unit consists of one or more PDB Channels, each with 8 PDB Pretriggers. Each PDB pretrigger will control the timing of one ADC channel conversion.

The major components of PDB unit are illustrated in below diagram, for more details please check the associated chapter in Reference Manual:



The PDB pretriggers can work in either Back to Back Mode or with individual Delays for channel conversions. This can be configured for each ADC group using the following fields: Adc Group In Back to Back Mode, Adc Group Uses Channel Delays and Adc Delay Next PDB.

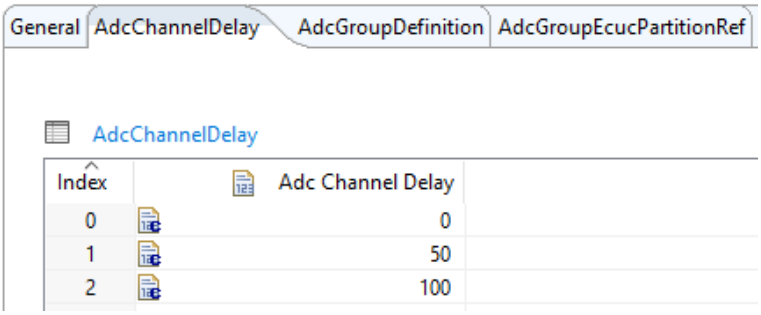
Some general settings of PDB Unit can be configured by the user in ADC driver: clock prescaler settings, auto-clearing of PDB internal errors, user notification for PDB internal errors.



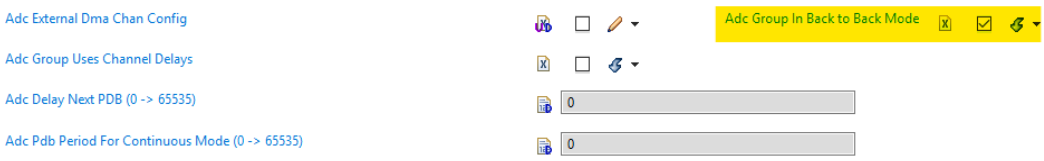
Adc Pdb Prescaler Divider Select and **Adc Pdb Multiplication Factor Select for Prescaler** can be used to fine tune the frequency at which PDB counter works. These values will be written into PRESCALER and MULT bitfields of PDB_SC register during initialization. The PDB counter uses the peripheral clock divided by the product of a factor (selected by MULT field) and an integer factor (set by PRESCALER field) like in this formula (peripheral clock)/(MULT x PRESCALER). For more details about the implementation of these bit fields in the hardware please check the Reference Manual.

Setting **Adc Pdb Sequence Error Notification** is used to configure call back function for the PDB sequence error interrupt. The sequence error flags can be set as result of various invalid scenarios involving the PDB, most usual being that one pretrigger becomes asserted and requests a conversion to ADC unit while another conversion is still ongoing. When one of these flags is set, the PDB unit will be stuck and not request any conversions until the flags are cleared. The flags will be cleared by PDB sequence error interrupt (if enabled), and an optional notification function will be called to signal this event to the user.

The PDB is used together with ADC hardware unit for all group conversions (HW triggered or SW triggered). There is a dedicated sub-container in every group for configuring the delays associated with each channel:



3.6.10 PDB in Back to Back Mode



When this parameter is enabled, the PDB pretriggers will be configured to work in back to back mode: PDB_C↩ H1n_C1[BB] bits are set for all the group channels, except the first one. The first channel conversion complete will trigger the PDB channel's second pretrigger, and so on until the last channel of the group. This ensures that the channel conversions occur in sequence, as quickly as possible and without causing internal PDB errors.

The ADC driver can convert only up to N channels at once, where N is number of SC1 registers available. If the groups have more channels than that, ADC driver will split the group in sub-groups of N and convert them with sub-group conversions. Interrupt processing is needed between the sub-groups for register re-configuration. The N channels are converted using one or more PDB channels (each controlling 8 pretriggers), but the different channels do not work in back to back mode together, so a delay is needed between the PDB channels, otherwise PDB errors will occur. ADC driver will configure this delay value when Back to back mode is used, with the value defined by the user in **Adc Delay Next PDB** parameter. The sequences of 8 channels associated to a PDB channel will happen in back to back mode.

Note

- If **Adc Group In Back to Back Mode** is not enabled for a group, all pretriggers of the PDB channels will be triggered at the same time causing internal PDB errors, unless the coherence of channel conversions is ensured via the delay configured for each pretrigger. This is why at least one of **Adc Group In Back to Back Mode** and **Adc Group Uses Channel Delays** options needs to be configured for an ADC Group. If both parameters are configured for the ADC Group, the user can configure a delay only for the first channel conversion, and the rest will be converted in back to back mode.
- If **Adc Group Uses Channel Delays** is not enabled for the group, the first channel will have an associated delay of 0, and will convert immediately after the external trigger is received.
- If a hardware unit has only groups running in Back to Back Mode that have more than 8 channels, **Pdb Enable Inter-channel Back to Back Mode** from PdbHwUnit can be enabled to also have the PDB channels, in addition to pretriggers, running in Back to Back Mode. This ensures that each channel will start it's pretrigger chain as quickly as possible and without causing internal PDB errors. This is available only on S32K14xW devices.

3.6.11 ADC Group Uses PDB Channel Delays

When this parameter is enabled, the PDB pretriggers will have individual delays configured. PDB_CH1nDLYx will be set with the values configured in AdcChannelDelay list for each channel. The values must not be equal or too close, otherwise PDB internal errors will occur.

The ADC driver can convert only up to N channels at once, where N is number of SC1 registers available. If the groups have more channels than that, ADC driver will split the group in sub-groups of N and convert them with sub-group conversions. Interrupt processing is needed between the sub-groups for register re-configuration. The timing of the channel conversions will be accurate only for the first N channels; for the next ones, on top of the configured delay, the delay of previous conversions and interrupt processing will be implicitly added. For this reason, it's safe to configure a delay of 0 for the N+1 channel. But the delay values for each group of N need to be increasing, so that the channel conversions occur in the order they were defined in the group.

If **Adc Group In Back to Back Mode** is also configured for the ADC Group, the user can configure a delay only for the first channel conversion, and the rest will be converted in Back to Back mode. The delay value defined by the user in **Adc Delay Next PDB** parameter will be used to avoid PDB internal errors.

3.6.12 Configuring the delay between PDB channel conversions

The PDB unit can have one or more PDB Channels of 8 pretriggers each that will be used together for setting up conversions of large groups. The PDB Channels will be started together when the PDB unit is triggered, thus risking to request conversions at the same time and causing internal errors. For this reason, the value of **Adc Delay Next PDB** is needed to be added as delay between PDB channels when Back to Back mode is used. The ADC driver supported to configure this value at group configuration level as below:

Note

The **Adc Delay Next PDB** value should be greater than the timing to convert 8 channels.

3.6.13 Some restrictions of Hardware

- Hardware triggered groups and software triggered groups cannot function in parallel
- The Result Buffers will be overflowed if PDB trigger period between each channel is too short. Minimum required period depends on each derivative. It is recommended to use the default delay period or an ADC group in back to back mode.

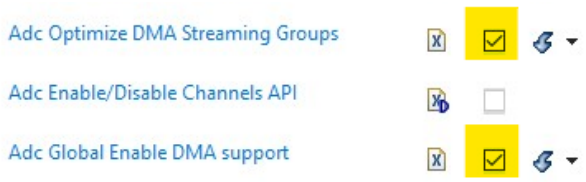
3.6.14 Optimize DMA Streaming Groups

The ADC driver provides an optional configuration parameter for reducing the number of DMA interrupts required for processing the conversions of Adc Groups which are configured as ADC_ACCESS_MODE_STREAMING. Instead of having an interrupt after every end of chain group conversion, only 2 interrupts will be raised for a stream of N conversions – one after N/2 conversions, and one after all N conversions are completed.

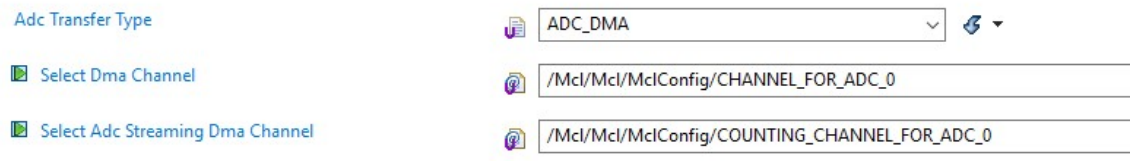
- In this feature, if group has more than one channel, streaming DMA is required. In that case, driver will use both transferring DMA and streaming DMA (AdcDmaChannelId and AdcStreamingDmaChannelId). Streaming DMA acts as a hardware counter which has CITER/BITER value equals to group sample as configured by AdcStreamingNumSamples parameter. Each single ADC conversion completion will trigger a request to Adc↩ DmaChannelId. Then this channel will copy 16-bit data from ADC Data Register (Rn) to the user buffers. When all ADC channels are completed, this channel will start DMA Channel Linking (AdcStreamingDma↩ ChannelId - Major Elink Channel). The DMA's CITER of the Streaming DMA Channel will be decreased by 1 and also transfer a dummy data, that means one sample has been completed. When all ADC samples are completed, the streaming DMA channel will finish its major loop. Both interrupts occurring after half of conversions are done and after all of them are done will be raised by the streaming DMA channel.
- If group doesn't have this feature enabled or it has enabled but has only one channel, driver will only use transferring DMA.

Configuration-time-prerequisites:

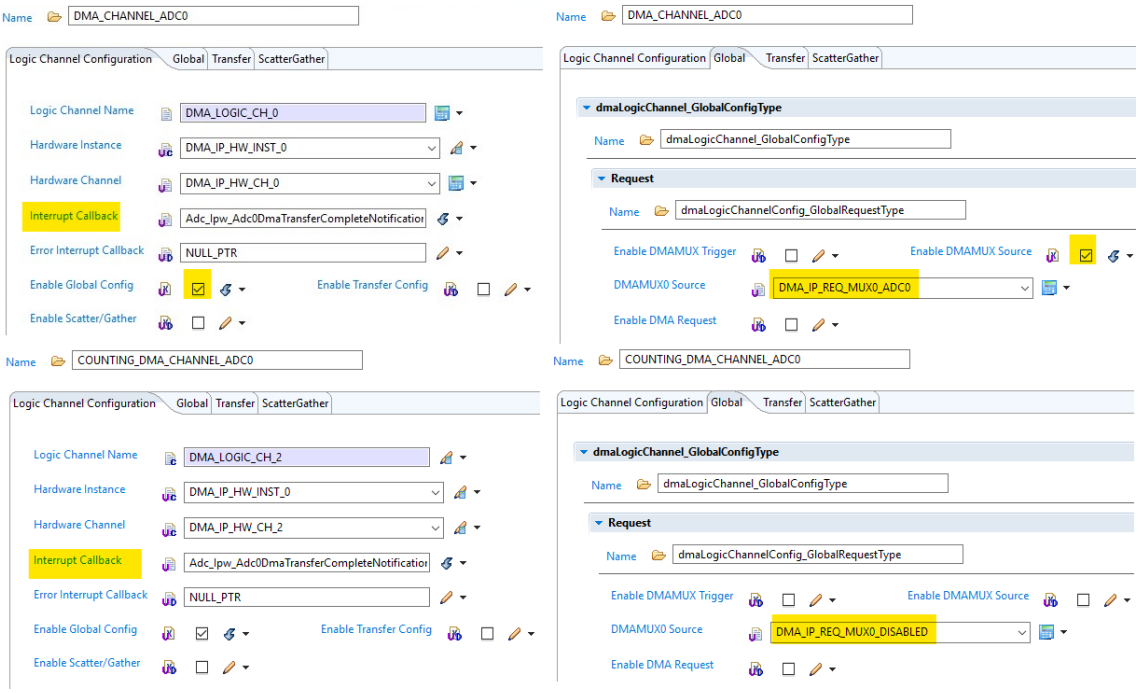
- Enable both AdcEnableDmaTransferMode and AdcOptimizeDmaStreamingGroups:



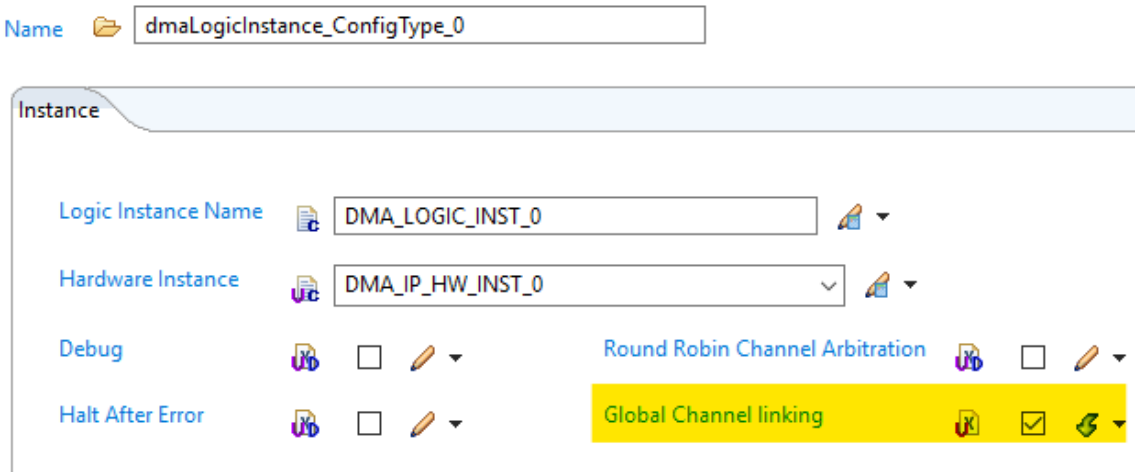
- Configure AdcTransferType as ADC_DMA type and select transferring DMA (and also streaming DMA if there is at least one ADC group which enables optimize DMA streaming groups with more than one ADC channel).



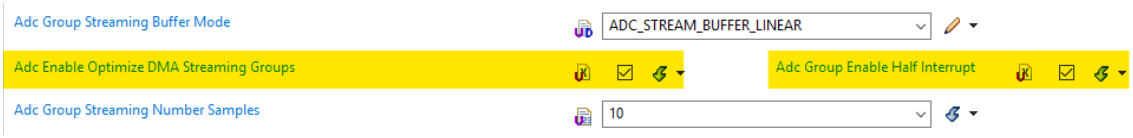
- Note that transferring (and streaming DMA) need to have Interrupt Callback (e.g: Adc_Ipw_Adc0Dma↩ TransferCompleteNotification()) and enable DMA MUX source (e.g: DMA_IP_REQ_MUX0_ADC0) equivalent to the ADC hardware unit is being used.



- Global channel linking also need to be enabled for this feature



- At group level, AdcEnableOptimizeDmaStreamingGroups (and AdcEnableHalfInterrupt if half interrupt is used) need to be enabled



Note

- Adc_SetChannel() and Optimize one-shot hardware trigger cannot be use concurrently with this feature.
- This feature is supported only for the groups which have number of channels less than total number of available SC registers.

3.7 Runtime errors

The driver generates the following DET runtime errors at runtime.

Function	Error Code	Condition triggering the error
Adc_StartGroupConversion()	ADC_E_TIMEOUT	Timed out. Ongoing conversion could not be aborted.
Adc_StopGroupConversion()	ADC_E_TIMEOUT	Timed out. Ongoing conversion could not be aborted.
Adc_Calibrate()	ADC_E_TIMEOUT	Timed out. Calibration operation timed out.

3.8 Symbolic Names Disclaimer

All containers having symbolicNameValue set to TRUE in the AUTOSAR schema will generate defines like:

#define <Mip>Conf_<Container_ShortName>_<Container_ID>

For this reason it is forbidden to duplicate the names of such containers across the RTD configurations or to use names that may trigger other compile issues (e.g. match existing `#ifdefs` arguments).

Chapter 4

Tresos Configuration Plug-in

This chapter describes the Tresos configuration plug-in for the driver. All the parameters are described below.

- Module Adc
  - Container AdcConfigSet
    - Container AdcHwUnit
      - Parameter AdcHwUnitId
      - Parameter AdcLogicalUnitId
      - Parameter AdcTransferType
      - Parameter AdcClockSource
      - Parameter AdcPrescale
      - Parameter AdcAltPrescale
      - Parameter AdcCalibrationPrescale
      - Parameter AdcHwUnitUsrOffset
      - Parameter AdcHwUnitUsrGain
      - Parameter AdcHwUnitResolution
      - Reference AdcDmaChannelId
      - Reference AdcCountingDmaChannelId
      - Reference AdcHwUnitEcucPartitionRef
      - Container AdcNormalConvTimings
      - Parameter AdcHardwareAverageEnable
      - Parameter AdcHardwareAverageSelect
      - Parameter AdcSampleTimeDuration
      - Container AdcAlternateConvTimings
      - Parameter AdcHardwareAverageEnableAlternate
      - Parameter AdcHardwareAverageSelectAlternate
      - Parameter AdcSampleTimeDurationAlternate
      - Container PdbHwUnit
      - Parameter AdcPdbPrescalerDividerSelect
      - Parameter AdcPdbMultiplicationFactorSelect
      - Parameter AdcPdbCounterPeriod
      - Parameter AdcPdbErrorNotification
      - Parameter PdbInterChnBackToBackEnable

- Container AdcChannel
- Parameter AdcLogicalChannelId
- Parameter AdcChannelName
- Parameter AdcChannelId
- Parameter AdcChannelConvTime
- Parameter AdcChannelLimitCheck
- Parameter AdcChannelHighLimit
- Parameter AdcChannelLowLimit
- Parameter AdcChannelRangeSelect
- Parameter AdcChannelRefVoltsrcHigh
- Parameter AdcChannelRefVoltsrcLow
- Parameter AdcChannelResolution
- Parameter AdcChannelSampTime
- Container AdcGroup
- Parameter AdcGroupAccessMode
- Parameter AdcGroupConversionMode
- Parameter AdcGroupConversionType
- Parameter AdcGroupId
- Parameter AdcGroupPriority
- Parameter AdcGroupReplacement
- Parameter AdcGroupTriggSrc
- Parameter AdcHwTrigSignal
- Parameter AdcHwTrigTimer
- Parameter AdcNotification
- Parameter AdcExtraNotification
- Parameter AdcStreamingBufferMode
- Parameter AdcEnableOptimizeDmaStreamingGroups
- Parameter AdcEnableHalfInterrupt
- Parameter AdcStreamingNumSamples
- Parameter AdcStreamResultGroup
- Parameter AdcEnableChDisableChGroup
- Parameter AdcWithoutInterrupts
- Parameter AdcWithoutDma
- Parameter AdcExtDMAChanEnable
- Parameter AdcGroupInBacktoBackMode
- Parameter AdcGroupUsesChannelDelays
- Parameter AdcDelayNextPdb
- Parameter AdcPdbPeriodContinuousMode
- Parameter AdcChannelDelay
- Reference AdcGroupHwTriggerSource
- Reference AdcGroupDefinition
- Reference AdcGroupEcucPartitionRef
- Container AdcGroupConversionConfiguration
- Parameter AdcGroupHardwareAverageEnable
- Parameter AdcGroupHardwareAverageSelect
- Parameter AdcGroupSampleTimeDuration
- Container AdcAlternateGroupConvTimings

      - Parameter AdcGroupAltHardwareAverageEnable
      - Parameter AdcGroupAltHardwareAverageSelect
      - Parameter AdcGroupAltSampleTimeDuration
    * Container AdcHwTrigger
      - Parameter AdcHwTrigSrc
- Container AdcGeneral
  * Parameter AdcDeInitApi
  * Parameter AdcDevErrorDetect
  * Parameter AdcEnableLimitCheck
  * Parameter AdcEnableQueuing
  * Parameter AdcPriorityQueueMaxDepth
  * Parameter AdcEnableStartStopGroupApi
  * Parameter AdcGrpNotifCapability
  * Parameter AdcHwTriggerApi
  * Parameter AdcPriorityImplementation
  * Parameter AdcReadGroupApi
  * Parameter AdcResultAlignment
  * Parameter AdcVersionInfoApi
  * Parameter AdcLowPowerStatesSupport
  * Parameter AdcPowerStateAsynchTransitionMode
  * Reference AdcEcucPartitionRef
  * Reference AdcKernelEcucPartitionRef
  * Container AdcPowerStateConfig
    - Parameter AdcPowerState
    - Parameter AdcPowerStateReadyCbkRef
- Container AdcInterrupt
  * Parameter AdcInterruptSource
  * Parameter AdcInterruptEnable
- Container AdcPublishedInformation
  * Parameter AdcChannelValueSigned
  * Parameter AdcGroupFirstChannelFixed
  * Parameter AdcMaxChannelResolution
- Container CommonPublishedInformation
  * Parameter ArReleaseMajorVersion
  * Parameter ArReleaseMinorVersion
  * Parameter ArReleaseRevisionVersion
  * Parameter ModuleId
  * Parameter SwMajorVersion
  * Parameter SwMinorVersion
  * Parameter SwPatchVersion
  * Parameter VendorApiInfix

        * Parameter VendorId
    - Container AutosarExt
        * Parameter AdcTimeoutMethod
        * Parameter AdcTimeoutVal
        * Parameter AdcIpDevErrorDetect
        * Parameter PdbIpDevErrorDetect
        * Parameter AdcMulticoreSupport
        * Parameter AdcEnableGroupDependentChannelNames
        * Parameter AdcBypassAbortChainCheck
        * Parameter AdcConvTimeOnce
        * Parameter AdcOptimizeOneShotHwTriggerConversions
        * Parameter AdcOptimizeDmaStreamingGroups
        * Parameter AdcContinuousWithoutInterrupt
        * Parameter AdcEnableChDisableChApi
        * Parameter AdcEnableInitialNotification
        * Parameter AdcEnableDmaTransferMode
        * Parameter AdcEnableUserModeSupport
        * Parameter AdcEnableSimSupplyMonitor
        * Parameter AdcEnablePdbInterChannelBackToBackSupport
        * Parameter AdcEnableSetChannel
        * Parameter AdcEnableDualClockMode
        * Parameter AdcEnableCalibration
        * Parameter AdcEnableReadRawDataApi
        * Parameter AdcEnableGroupStreamingResultReorder

4.1 Module Adc

Configuration of the Adc (Analog Digital Conversion) module.

Included containers:

- AdcConfigSet
- AdcGeneral
- AdcInterrupt
- AdcPublishedInformation
- CommonPublishedInformation
- AutosarExt

Property	Value
type	ECUC-MODULE-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantSupport	true
supportedConfigVariants	VARIANT-POST-BUILD, VARIANT-PRE-COMPILE

4.2 Container AdcConfigSet

This container contains the configuration parameters and sub containers of the AUTOSAR Adc module.

Included subcontainers:

- AdcHwUnit
- AdcHwTrigger

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.3 Container AdcHwUnit

This container contains the Driver configuration (parameters) depending on grouping of channels. This container could contain HW specific parameters which are not defined in the Standardized Module Definition. They must be added in the Vendor Specific Module Definition.

Included subcontainers:

- AdcNormalConvTimings
- AdcAlternateConvTimings
- PdbHwUnit
- AdcChannel
- AdcGroup

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.4 Parameter AdcHwUnitId

Numeric ID of the HW Unit. This symbolic name allows accessing Hw Unit data. Enumeration literals are defined vendor specific.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC0
literals	['ADC0', 'ADC1']

4.5 Parameter AdcLogicalUnitId

Specifies the Logical id of the Hardware Unit.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false

Property	Value
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	1
min	0

4.6 Parameter AdcTransferType

Select the Interrupt or Dma transfer Type. If DMA is used, user must not run SW and HW groups at the same time on the same HW unit because the same DMA channel will be used for both.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_INTERRUPT
literals	['ADC_INTERRUPT', 'ADC_DMA']

4.7 Parameter AdcClockSource

The ADC module specific clock input for the conversion unit can statically be configured to select different clock sources if provided by hardware. Enumeration literals are defined vendor specific.

ADC_ALTCLK1 - Alternate clock 1.

ADC_ALTCLK2 - Alternate clock 2.

ADC_ALTCLK3 - Alternate clock 3.

ADC_ALTCLK4 - Alternate clock 4.

.

Note: Only ADC_ALTCLK1 is used by the current implementation.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_ALTCLK1
literals	['ADC_ALTCLK1', 'ADC_ALTCLK2', 'ADC_ALTCLK3', 'ADC_ALTCLK4']

4.8 Parameter AdcPrescale

Optional ADC module specific clock prescale factor, if supported by hardware.

ImplementationType: Adc_PrescaleType.

The Prescaler value for NORMAL mode. Only the following are allowed:

1: ADC clock frequency is equal to bus clock.

2: ADC clock frequency is half of bus clock.

4: ADC clock frequency is quarter of bus clock.

8: ADC clock frequency is eighth of bus clock.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	1
max	8
min	1

4.9 Parameter AdcAltPrescale

The Prescaler value for ALTERNATE mode. This feature can be configured if Adc Set Clock Mode API from General/AutosarExt is enabled. Only the following are allowed:

1: ADC clock frequency is equal to bus clock.

2: ADC clock frequency is half of bus clock.

4: ADC clock frequency is quarter of bus clock.

8: ADC clock frequency is eighth of bus clock.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	2
max	8
min	1

4.10 Parameter AdcCalibrationPrescale

Specifies the used clock input for calibration. This feature can be configured if Adc Enable Calibration API from General/AutosarExt is enabled.

1: ADC clock frequency is equal to bus clock.

2: ADC clock frequency is half of bus clock.

4: ADC clock frequency is quarter of bus clock.

8: ADC clock frequency is eighth of bus clock.

IMPORTANT NOTE: The clock for calibration must be less than or equal to half of maximum specified frequency (50Mhz) and higher than minimum frequency (2Mhz).

Please refer to Datasheet for more details.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	8
max	8
min	1

4.11 Parameter AdcHwUnitUsrOffset

Set user defined offset.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	255
min	0

4.12 Parameter AdcHwUnitUsrGain

Set user defined gain.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP

Property	Value
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	4
max	1023
min	0

4.13 Parameter AdcHwUnitResolution

Select the number of significant bits per conversion data.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	RESOLUTION_12
literals	['RESOLUTION_12', 'RESOLUTION_10', 'RESOLUTION_8']

4.14 Reference AdcDmaChannelId

ID of the DMA channel used to transfer the data.

Property	Value
type	ECUC-REFERENCE-DEF
origin	NXP
lowerMultiplicity	0
upperMultiplicity	1

Property	Value
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/Mcl/MclConfig/dmaLogicChannel_Type

4.15 Reference AdcCountingDmaChannelId

Configurable only when Transfer Type is DMA and at least one group of hw unit has:

AdcEnableOptimizeDmaStreamingGroups enabled with more than one ADC channel

OR has selected Without Interrupts, ACCESS_MODE_STREAMING and Group Streaming Results Reorder and number of channels > 1

OR has selected Without Interrupts, ACCESS_MODE_STREAMING and a single channel - for this case, AutosarExt Adc Enable Group Streaming Results Reorder feature must be enabled, but can be disabled at group level.

Linked to DMA channel by ADC driver, to count the number of samples converted in streaming mode

Property	Value
type	ECUC-REFERENCE-DEF
origin	NXP
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/Mcl/MclConfig/dmaLogicChannel_Type

4.16 Reference AdcHwUnitEcucPartitionRef

Maps a ADC hardware unit to zero or one ECUC partition to limit the access to this hardware unit. The ECUC partitions referenced are a subset of the ECUC partitions where the ADC driver is mapped to. This parameter is disabled, there is no multicore support implemented for this platform.

Property	Value
type	ECUC-REFERENCE-DEF
origin	NXP
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/EcuC/EcucPartitionCollection/EcucPartition

4.17 Container AdcNormalConvTimings

Selects Normal values used for programming clock frequency, conversion timing and hardwre averaging used at initialization and also by Adc_SetClockMode API when it is called with parameter ADC_NORMAL.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.18 Parameter AdcHardwareAverageEnable

Enables the hardware average function of the ADC.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1

Property	Value
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.19 Parameter AdcHardwareAverageSelect

Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADCx_MCR[AVGEN] = 1.

SAMPLES_4 - 4 samples averaged.

SAMPLES_8 - 8 samples averaged.

SAMPLES_16 - 16 samples averaged.

SAMPLES_32 - 32 samples averaged.

.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	SAMPLES_4
literals	['SAMPLES_4', 'SAMPLES_8', 'SAMPLES_16', 'SAMPLES_32']

4.20 Parameter AdcSampleTimeDuration

Input a value 1 to 255 means selecting a sample time of 2 to 256 ADCK clock cycles. The value written to this register is the desired sample time minus 1.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	12
max	255
min	1

4.21 Container AdcAlternateConvTimings

Selects Alternate values used in Adc_SetClockMode API for programming CTR Conversion Timing Registers.
This container is available only when AdcEnableDualClockMode has been enabled. Hardware averaging functionality is also available for configuration

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.22 Parameter AdcHardwareAverageEnableAlternate

Alternate configuration: Enables the hardware average function of the ADC.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP

Property	Value
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.23 Parameter AdcHardwareAverageSelectAlternate

Alternate configuration: Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADCx_MCR[AVGEN] = 1.

SAMPLES_4 - 4 samples averaged.

SAMPLES_8 - 8 samples averaged.

SAMPLES_16 - 16 samples averaged.

SAMPLES_32 - 32 samples averaged.

.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	SAMPLES_4
literals	['SAMPLES_4', 'SAMPLES_8', 'SAMPLES_16', 'SAMPLES_32']

4.24 Parameter AdcSampleTimeDurationAlternate

Alternate configuration: Input a value 1 to 255 means selecting a sample time of 2 to 256 ADCK clock cycles. The

value written to this register is the desired sample time minus 1.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	12
max	255
min	1

4.25 Container PdbHwUnit

This container contains the configuration of the PDB unit.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.26 Parameter AdcPdbPrescalerDividerSelect

Determines the prescaler used for the PDB counter.

0 - Counting uses the peripheral clock divided by multiplication factor selected by AdcPdbMultiplicationFactorSelect.

1 - Counting uses the peripheral clock divided by twice of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

2 - Counting uses the peripheral clock divided by four of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

3 - Counting uses the peripheral clock divided by eight of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

4 - Counting uses the peripheral clock divided by 16 times of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

5 - Counting uses the peripheral clock divided by 32 times of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

6 - Counting uses the peripheral clock divided by 64 times of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

7 - Counting uses the peripheral clock divided by 128 times of the multiplication factor selected by AdcPdbMultiplicationFactorSelect.

.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	7
min	0

4.27 Parameter AdcPdbMultiplicationFactorSelect

Selects the multiplication factor of the prescaler divider for the counter clock of the associated PDB unit.

0 - Multiplication factor is 1.

1 - Multiplication factor is 10.

2 - Multiplication factor is 20.

3 - Multiplication factor is 40.

.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	3
min	0

4.28 Parameter AdcPdbCounterPeriod

Specifies the period of the counter. When

the counter reaches this value, it will be reset back to zero. If

the PDB is in Continuous mode, the count begins anew. Reading this

field returns the value of the internal register that is effective

for the current cycle of PDB.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	65535
max	65535
min	0

4.29 Parameter AdcPdbErrorNotification

Callback function for PDB channel sequence error. This function pointer is called everytime when PDB channel sequence error occurred. Setting this field to a non-null value will also enable the interrupt.

Property	Value
type	ECUC-FUNCTION-NAME-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	NULL_PTR

4.30 Parameter PdbInterChnBackToBackEnable

Enable the inter-channel back to back mode between PDBx CH0 and PDBx CH1 pre-triggers, forming a ring (PDBx_CH0_pretrigger7 -> PDBx_CH1_pretrigger0 and PDBx_CH1_pretrigger7 -> PDBx_CH0_pretrigger0).

NOTE: this configuration is dedicated to each PDB instance.

If this node is enabled, AdcDelayNextPdb is not required in all group configured with back to back mode and number of channels is greater than 8

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.31 Container AdcChannel

This container contains the channel configuration (parameters) depending on the hardware capability.

The organization of this data structure could contain dependencies to the microcontroller so this is left up to the implementer and its location is left up to the configuration.

Note: Since a AdcChannel can be part of several AdcGroups, this container is not realized as a subcontainer of AdcGroup but instead as a subcontainer of AdcHwUnit.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.32 Parameter AdcLogicalChannelId

This is the logical Id of the ADC channel.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	1024
min	0

4.33 Parameter AdcChannelName

This parameter defines the assignment of the channel to the physical ADC hardware channel. Note: - Range of the ADC Channels depends on the selected package.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	SE0_ADCH0
literals	['SE0_ADCH0', 'SE1_ADCH1', 'SE2_ADCH2', 'SE3_ADCH3', 'SE4_ADCH4', 'SE5_ADCH5', 'SE6_ADCH6', 'SE7_ADCH7', 'SE8_ADCH8', 'SE9_ADCH9', 'SE10_ADCH10', 'SE11_ADCH11', 'SE12_ADCH12', 'SE13_ADCH13', 'SE14_ADCH14', 'SE15_ADCH15', 'SE16_ADCH32', 'SE17_ADCH33', 'SE18_ADCH34', 'SE19_ADCH35', 'SE20_ADCH36', 'SE21_ADCH37', 'SE22_ADCH38', 'SE23_ADCH39', 'SE24_ADCH40', 'SE25_ADCH41', 'SE26_ADCH42', 'SE27_ADCH43', 'SE28_ADCH44', 'SE29_ADCH45', 'SE30_ADCH46', 'SE31_ADCH47', 'VDD_INT0_ADCH21', 'VDDA_INT0_ADCH21', 'VREFH_INT0_ADCH21', 'VDD_3V_INT0_ADCH21', 'VDD_FLASH_3V_INT0_ADCH21', 'VDD_LV_INT0_ADCH21', 'BANDGAP_ADCH27', 'VREFH_ADCH29', 'VREFL_ADCH30']

4.34 Parameter AdcChannelId

This parameter defines the assignment of the channel to the physical ADC hardware channel. Note: - Range of the ADC Channels depends on the selected package.

IMPORTANT NOTE: This node must be in sync with 'Adc Physical Channel Name': must be equal with number specified after 'ADCH' in the selected 'Adc Physical Channel Name'. E.g. INT_CH_0_ADCH21 => Channel ID must be 21. The node is required by Autosar standard. 'Adc Physical Channel Name' node is added because refers to names from ReferenceManual and is more user friendly.

In Tresos configurator, after selecting a new Channel Name, the new Channel Id value can be filled in automatically by using 'Calculate Value' button.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	1024
min	0

4.35 Parameter AdcChannelConvTime

Configuration of conversion time, i.e. the time during which the analogue value is converted into digital representation, (in clock cycles) for each channel, if supported by hardware.

ImplementationType: Adc_ConversionTimeType.

This parameter is not used by the current implementation.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	18446744073709551615
min	0

4.36 Parameter AdcChannelLimitCheck

Enables or disables limit checking for an ADC channel.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.37 Parameter AdcChannelHighLimit

High limit - used for limit checking.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	255
max	18446744073709551615
min	0

4.38 Parameter AdcChannelLowLimit

Low limit - used for limit checking.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC

Property	Value
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	18446744073709551615
min	0

4.39 Parameter AdcChannelRangeSelect

In case of active limit checking: defines which conversion values are taken into account related to the boarders defined with AdcChannelLowLimit and AdcChannelHighLimit.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_RANGE_ALWAYS
literals	['ADC_RANGE_ALWAYS', 'ADC_RANGE_BETWEEN', 'ADC_RANGE↩_NOT_BETWEEN', 'ADC_RANGE_NOT_OVER_HIGH', 'ADC_RANG↩E_NOT_UNDER_LOW', 'ADC_RANGE_OVER_HIGH', 'ADC_RANGE↩_UNDER_LOW']

4.40 Parameter AdcChannelRefVoltsrcHigh

Upper reference voltage source for each channel. Enumeration literals are defined vendor specific.

This parameter is not used by the current implementation.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	UPPER_REF_VOLT_0
literals	['UPPER_REF_VOLT_0']

4.41 Parameter AdcChannelRefVoltsrcLow

Lower reference voltage source for each channel. Enumeration literals are defined vendor specific.

This parameter is not used by the current implementation.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	LOWER_REF_VOLT_0
literals	['LOWER_REF_VOLT_0']

4.42 Parameter AdcChannelResolution

Channel Resolution in bits of converted value. This value is not used. The resolution can be modified at hardware unit level.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	12
max	63
min	1

4.43 Parameter AdcChannelSampTime

Sampling time, i.e. the time during which the value is sampled, (in clock cycles) for each channel. Not used.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	22
max	254
min	8

4.44 Container AdcGroup

This container contains the Group configuration (parameters).

Included subcontainers:

- AdcGroupConversionConfiguration
- AdcAlternateGroupConvTimings

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.45 Parameter AdcGroupAccessMode

Type of access mode to group conversion results.

ImplementationType: Adc_GroupAccessModeType.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_ACCESS_MODE_SINGLE
literals	['ADC_ACCESS_MODE_SINGLE', 'ADC_ACCESS_MODE_STREAMING']

4.46 Parameter AdcGroupConversionMode

Type of conversion mode supported by the driver.

ImplementationType: Adc_GroupConvModeType.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC

Property	Value
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_CONV_MODE_ONESHOT
literals	['ADC_CONV_MODE_ONESHOT', 'ADC_CONV_MODE_CONTINUOUS']

4.47 Parameter AdcGroupConversionType

Normal or Injected conversion type.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_CONV_TYPE_NORMAL
literals	['ADC_CONV_TYPE_NORMAL']

4.48 Parameter AdcGroupId

Numeric ID of the group. This parameter is the symbolic name to be used on the API. This symbolic name allows accessing Channel Group data. This value will be assigned to the symbolic name derived of the AdcGroup container shortName.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	true

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	1023
min	0

4.49 Parameter AdcGroupPriority

Priority level of the AdcGroup. This item is ignored if Adc/AdcGeneral/AdcPriorityImplementation is defined to ADC_PRIORITY_NONE.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	255
min	0

4.50 Parameter AdcGroupReplacement

Replacement mechanism, which is used on ADC group level, if a group conversion is interrupted by a group which has a higher priority.

ImplementationType: Adc_GroupReplacementType

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF

Property	Value
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_GROUP_REPL_ABORT_RESTART
literals	['ADC_GROUP_REPL_ABORT_RESTART', 'ADC_GROUP_REPL_SU↩ SPEND_RESUME']

4.51 Parameter AdcGroupTriggSrc

Type of source event that starts a group conversion. It' s possible select Hw or Sw trigger.

In case of Hw trigger the trigger source can be from the PDB. Only trigger sources from PDB is used by the current implementation. The trigger source connected to PDB can be configured from Mcl module.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_TRIGG_SRC_SW
literals	['ADC_TRIGG_SRC_HW', 'ADC_TRIGG_SRC_SW']

4.52 Parameter AdcHwTrigSignal

Configures the edge of the hardware trigger signal, i.e. to start the conversion. This parameter is not used by the current implementation.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_HW_TRIG_RISING_EDGE
literals	['ADC_HW_TRIG_BOTH_EDGES', 'ADC_HW_TRIG_RISING_EDGE', 'ADC_HW_TRIG_FALLING_EDGE']

4.53 Parameter AdcHwTrigTimer

Reload value of the ADC module embedded timer. This parameter is not used by the current implementation.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	18446744073709551615
min	0

4.54 Parameter AdcNotification

Callback function for each group. This function pointer is called whenever the conversion of this group is completed.

Property	Value
type	ECUC-FUNCTION-NAME-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	NULL_PTR

4.55 Parameter AdcExtraNotification

Extra callback function for each group. This function pointer will be called at the beginning of the interrupt routine, before updating any HW registers or Group status.

Property	Value
type	ECUC-FUNCTION-NAME-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	NULL_PTR

4.56 Parameter AdcStreamingBufferMode

Select the streaming buffer as linear buffer (i.e. the ADC Driver stops the conversion as soon as the stream buffer is full) or as circular buffer (wraps around if the end of the stream buffer is reached).

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_STREAM_BUFFER_LINEAR
literals	['ADC_STREAM_BUFFER_LINEAR', 'ADC_STREAM_BUFFER_CIRC↩ ULAR']

4.57 Parameter AdcEnableOptimizeDmaStreamingGroups

Enable/Disable The Adc driver enable Optimize DMA streaming groups for reducing the number of interrupts required for processing the conversions of Adc Groups that consist of one or more channels (depending on HW capabilities) and which are configured as ADC_ACCESS_MODE_STREAMING.

When this feature is enabled, only one interrupt will be raised after the completion of all stream conversions (as configured by AdcStreamingNumSamples parameter). An additional interrupt to be raised after half of the stream is converted shall also be configurable.

This feature is enabled if Adc Global Enable DMA Transfer from General/AutosarExt is also enabled.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.58 Parameter AdcEnableHalfInterrupt

Enable/ Disable the interrupt when half sample complete for optimize DMA streaming groups feature. AutosarExt/AdcOptimiz must be enable for configure this feature.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.59 Parameter AdcStreamingNumSamples

Number of ADC values to be acquired per channel in streaming access mode.

Note: in single access mode this parameter assumes value 1, since only one sample per channel is processed.

ImplementationType: Adc_StreamNumSampleType.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	1
max	255
min	1

4.60 Parameter AdcStreamResultGroup

Arrange the ADC results as multiple sets of group result buffer.

E.g: for a group with channels {CH1 CH5 CH7} the resulting stream buffer shall be:

{ CH1, CH5, CH7, CH1, CH5, CH7, CH1, CH5, CH7}

instead of

{ CH1, CH1, CH1, CH5, CH5, CH5, CH7, CH7, CH7} like supported by AUTOSAR standard.

This Parameter can be configured only for groups configured with ADC_ACCESS_MODE_STREAMING Access Mode

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.61 Parameter AdcEnableChDisableChGroup

If this parameter is enabled, it allows the feature of enabling or disabling a particular channel in the group.

Max.no of Groups with this feature enabled, should be configured are 254 if the configuration parameter AdcEnableChDisableC is enabled in Autosar Extension container

NoteThis is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.62 Parameter AdcWithoutInterrupts

Enable/ Disable the occurring of ADC Interrupts and Reading of the group conversion results periodically without interrupts (ADC interrupt or DMA notification).

1. When this parameter is enabled, interrupts are disabled. The conversion will run without software intervention (no interrupt generated anymore) and the application can read the results by calling Adc_ReadGroup().

2. If Transfer Type is ADC_INTERRUPT (or ADC_DMA) and this one is enabled, the result buffer registered via Adc_SetupResultBuffer will no longer be used populated with results. Adc_ReadGroup will read the results directly from ADC HW registers (or Internal Dma Buffer).

When this parameter is Disabled, normal functionality shall be executed.

Note: This is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.63 Parameter AdcWithoutDma

When true, disables completely DMA configuration done by ADC driver for the group, to not affect other groups for which the ADC driver has already configured the DMA. It is intended to be used when DMA Transfer Mode is selected for the ADC unit, for groups required to work without interrupt and without DMA.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true

Property	Value
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.64 Parameter AdcExtDMAChanEnable

Enable/ Disable DMA functionality of individual group.

In this mode the adc will only enable the dma request for the last channel in the group and, so that the dma transfer will start after the group conversion has finished.

In this mode it is the users responsibility to configure the dma to transfer the data according to his needs

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.65 Parameter AdcGroupInBacktoBackMode

Enable/ Disable the channel conversions occuring in Back to Back mode.

The PDB hardware unit is used to initiate individual channel conversions that are required for each group conversion, with one PDB pretrigger controlling the timing of each ADC channel conversion.

When AdcGroupInBacktoBackMode is enabled, the PDB pretriggers will be confiugred to work in back to back mode: PDB_CH1n_C1[BB] bits are set for all the group channels, except the first one.

The first channel conversion complete will trigger the PDB channel's second pretrigger, and so on until the last channel of the group. This ensures that the channel conversions occur in sequence, as quickly as possible and without causing internal PDB errors.

The Adc driver can convert only up to N channels at once; for groups larger than N channels, Adc driver will split the group in sub-groups of N and convert them with sub-group conversions. Interrupt processing is needed between the sub-groups for register re-configuration. The 16 channels are converted using 2 PDB channels (each controlling 8 pretriggers), but the 2 channels do not work in back to back mode together, so a delay is needed for the 2nd PDB channel, otherwise PDB errors will occur. Adc driver will configure this delay value when Back to back mode is used, with the value defined by the user in AdcDelayNextPdb parameter. The sequences of 8 channels associated to a PDB channel will happen in back to back mode.

If AdcGroupInBacktoBackMode is not enabled for a group, all pretriggers of the PDB channels will be triggered at the same time causing internal PDB errors, unless the coherence of channel conversions is ensured via the delay configured for each pretrigger. This is why at least one of AdcGroupInBacktoBackMode and AdcGroupUsesChannelDelays options needs to be configured for an Adc Group.

If both parameters are configured for the Adc Group, the user can configure a delay only for the first channel conversion, and the rest will be converted in back to back mode.

If AdcGroupUsesChannelDelays is not configured for the group, the first channel will have an associated delay of 0, and will convert immediately after the external trigger is received.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.66 Parameter AdcGroupUsesChannelDelays

Enable/ Disable the usage of channel delays in PDB pretriggers.

The PDB hardware unit is used to initiate individual channel conversions that are required for each group conversion, with one PDB pretrigger controlling the timing of each ADC channel conversion.

When AdcGroupUsesChannelDelays is enabled, the PDB pretriggers will have individual delays configured. PDB_CH1nDLYx will be set with the values configured in AdcChannelDelay list for each channel. The values must not be equal or too close, otherwise PDB internal errors will occur.

The Adc driver can convert only up to N channels at once, N = 16/24/32 channels - depending on derivative (refer to Reference Manual for details). For groups larger than N channels, Adc driver will split the group in sub-groups of N and convert them with sub-group conversions. Interrupt processing is needed between the sub-groups for register re-configuration. The timing of the channel conversions will be accurate only for the first 16 channels; for the next ones, the on top of the configured delay, the delay of previous conversions and interrupt processing will be implicitly added. For this reason, it's safe to confiugre a delay of 0 for the Nth + 1 channel. But the delay values for each group of 16 need to be increasing, so that the channel conversions occur in the order they were defined in the group.

If AdcGroupInBacktoBackMode is also configured for the Adc Group, the user can configure a delay only for the first channel conversion, and the rest will be converted in back to back mode (see description of AdcGroupInBacktoBackMode). The delay value defined by the user in AdcDelayNextPdb parameter will be used for 2nd PDB channel to avoid PDB internal errors.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.67 Parameter AdcDelayNextPdb

The PDB unit can have one or more PDB Channels of 8 pretriggers each that will be used together for setting up conversions of large groups. The PDB Channels will be started together when the PDB unit is triggered, thus risking to request conversions at the same time and causing internal errors. For this reason, the value of AdcDelayNextPdb is needed to be added as delay between PDB channels when Back to Back mode is used. The AdcDelayNextPdb value should be greater than the timing to convert 8 channels. The maximum total conversion time is determined by the clock source chosen and the divide ratio selected. The clock source is selectable by CFG1[ADICLK], and the divide ratio is specified by CFG1[ADIV]. To calculate total conversion time for one channel the following formula is applied: ADC TOTAL CONVERSION TIME = Sample Phase Time (set by SMPLTS+1) + Hold Phase (1 ADC Cycle) + Compare Phase Time (8-bit Mode=20 ADC Cycles, 10-bit Mode=24 ADC Cycles, 12-bit Mode=28 ADC Cycles) + Single or First continuous time adder (5 ADC cycles + 5 bus clock cycles).

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	65535
min	0

4.68 Parameter AdcPdbPeriodContinuousMode

The period of PBD module in continuous mode. This is specific and only used for continuous group without interrupt. The PDB period should be big enough to ensure all of the channels complete the convertion before PDB restarts

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	1000
max	65535
min	0

4.69 Parameter AdcChannelDelay

Delay of the associated PDB pretrigger for this channel. If Back to Back mode is not used for this group, the user must ensure the difference between the delays of different channels are big enough to accomodate the Adc conversions without PDB channel sequence errors. If Back to Back mode is used for this group, only the delay for the first channel will be considered - the rest of the channels will be converted in back to back mode. The delay value have to be a increasing numbers for each sequence of 16/24/32 channels - depending on derivative (refer to Reference Manual for details).

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	65535
min	0

4.70 Reference AdcGroupHwTriggerSource

Select the HW trigger signal for triggering the conversion group. Configurable only when HW trigger source is selected for the group.

Property	Value
type	ECUC-REFERENCE-DEF
origin	NXP
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/TS_T40D2M10I1R0/Adc/AdcConfigSet/AdcHwTrigger

4.71 Reference AdcGroupDefinition

Assignment of channels to a AdcGroups. For each AdcChannel that should belong to the group, a reference needs to be defined.

Property	Value
type	ECUC-REFERENCE-DEF
origin	AUTOSAR_ECUC
lowerMultiplicity	1
upperMultiplicity	Infinite
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/Adc/AdcConfigSet/AdcHwUnit/AdcChannel

4.72 Reference AdcGroupEcucPartitionRef

Maps an ADC channel group to zero or multiple ECUC partitions to limit the access to this channel group. The ECUC partitions referenced are a subset of the ECUC partitions where the ADC driver is mapped to.

Property	Value
type	ECUC-REFERENCE-DEF
origin	AUTOSAR_ECUC
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/EcuC/EcucPartitionCollection/EcucPartition

4.73 Container AdcGroupConversionConfiguration

Configure the Sampling and Conversion TimeGroup.

Hardware averaging functionality is also available for configuration

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.74 Parameter AdcGroupHardwareAverageEnable

Enables the hardware average function of the ADC.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1

Property	Value
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.75 Parameter AdcGroupHardwareAverageSelect

Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADCx_MCR[AVGEN] = 1.

SAMPLES_4 - 4 samples averaged.

SAMPLES_8 - 8 samples averaged.

SAMPLES_16 - 16 samples averaged.

SAMPLES_32 - 32 samples averaged.

.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	SAMPLES_4
literals	['SAMPLES_4', 'SAMPLES_8', 'SAMPLES_16', 'SAMPLES_32']

4.76 Parameter AdcGroupSampleTimeDuration

Input a value 1 to 255 means selecting a sample time of 2 to 256 ADCK clock cycles. The value written to this register is the desired sample time minus 1.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	2
max	255
min	1

4.77 Container AdcAlternateGroupConvTimings

Selects Alternate values used for programming CTR Conversion Timing Registers in Adc_SetClockMode API. This is available when AdcEnableDualClockMode has been enabled and AdcConvTimeOnce has been disable. Hardware averaging functionality is also available for configuration

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.78 Parameter AdcGroupAltHardwareAverageEnable

Enables the alternate hardware average function of the ADC.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.79 Parameter AdcGroupAltHardwareAverageSelect

Selects the Group Alternate Hardware Average to determine how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADCx_MCR[AVGEN] = 1.

SAMPLES_4 - 4 samples averaged.

SAMPLES_8 - 8 samples averaged.

SAMPLES_16 - 16 samples averaged.

SAMPLES_32 - 32 samples averaged.

.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	SAMPLES_4
literals	['SAMPLES_4', 'SAMPLES_8', 'SAMPLES_16', 'SAMPLES_32']

4.80 Parameter AdcGroupAltSampleTimeDuration

Selects a alternate sample time of 2 to 256 ADCK clock cycles. The alternate value written to this register is the desired sample time minus 1.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	2
max	255
min	1

4.81 Container AdcHwTrigger

This container contains the Hardware trigger source configured for the group. Editable only if at least one group has HW trigger source selected.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.82 Parameter AdcHwTrigSrc

On this implementation the HW triggers available are from PDB.

(Note: This is an Implementation Specific Parameter.)

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF

Property	Value
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: POST-BUILD
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	TRIGGER_IN0
literals	['TRIGGER_IN0']

4.83 Container AdcGeneral

General configuration (parameters) of the ADC Driver software module.

Included subcontainers:

- AdcPowerStateConfig

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.84 Parameter AdcDeInitApi

Adds/removes the service Adc_DeInit() from the code.

true: Adc_DeInit() can be used.

false: Adc_DeInit() can not be used.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.85 Parameter AdcDevErrorDetect

Switches the development error detection and notification on or off.

true: detection and notification is enabled.

false: detection and notification is disabled.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.86 Parameter AdcEnableLimitCheck

Enables or disables limit checking feature in the ADC driver.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1

Property	Value
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.87 Parameter AdcEnableQueuing

Determines, if the queuing mechanism is active in case of priority mechanism disabled.

Note: If priority mechanism is enabled, queuing mechanism is always active and the parameter ADC_ENABLE_QUEUING is not evaluated.

true: Enabled.

false: Disabled.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.88 Parameter AdcPriorityQueueMaxDepth

Maximum depth of queue used for queuing of incoming conversion requests when hardware unit is busy.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1

Property	Value
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	1
max	1024
min	1

4.89 Parameter AdcEnableStartStopGroupApi

Adds / removes the services Adc_StartGroupConversion() and Adc_StopGroupConversion() from the code.

true: Adc_StartGroupConversion() and Adc_StopGroupConversion() can be used.

false: Adc_StartGroupConversion() and Adc_StopGroupConversion() can not be used.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.90 Parameter AdcGrpNotifCapability

Determines, if the group notification mechanism (the functions to enable and disable the notifications) is available at runtime.

true: Enabled.

false: Disabled.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.91 Parameter AdcHwTriggerApi

Adds / removes the services Adc_EnableHardwareTrigger() and Adc_DisableHardwareTrigger() from the code.

true: Adc_EnableHardwareTrigger() and Adc_DisableHardwareTrigger() can be used.

false: Adc_EnableHardwareTrigger() and Adc_DisableHardwareTrigger() can not be used.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.92 Parameter AdcPriorityImplementation

Determines whether a priority mechanism is available for prioritization of the conversion requests and if available, the type of prioritization mechanism. The selection applies for groups with trigger source software and trigger source hardware. Two types of prioritization mechanism can be selected.

The hardware prioritization mechanism (AdcPriorityHw) uses the ADC hardware features for prioritization of the software conversion requests and hardware trigger signals for groups with trigger source hardware.

The mixed hardware and software prioritization mechanism (AdcPriorityHwSw) uses the ADC hardware features for prioritization of ADC hardware trigger for groups with trigger source hardware and a software implemented prioritization mechanism for groups with trigger source software.

The group priorities for software triggered groups are typically configured with lower priority levels than the group priorities for hardware triggered groups.

ImplementationType: Adc_PriorityImplementationType.

Note: In this version the ADC_PRIORITY_HW isn't used.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_PRIORITY_NONE
literals	['ADC_PRIORITY_HW', 'ADC_PRIORITY_HW_SW', 'ADC_PRIORITY↩ _NONE']

4.93 Parameter AdcReadGroupApi

Adds / removes the service Adc_ReadGroup() from the code.

true: Adc_ReadGroup() can be used.

false: Adc_ReadGroup() can not be used.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.94 Parameter AdcResultAlignment

Alignment of ADC raw results in ADC result buffer (left/right alignment).

Implementation Type: Adc_ResultAlignmentType.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	ADC_ALIGN_RIGHT
literals	['ADC_ALIGN_RIGHT', 'ADC_ALIGN_LEFT']

4.95 Parameter AdcVersionInfoApi

Adds / removes the service Adc_GetVersionInfo() from the code.

true: Adc_GetVersionInfo() can be used.

false: Adc_GetVersionInfo() can not be used.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	true

4.96 Parameter AdcLowPowerStatesSupport

Adds / removes all power state management related APIs (ADC_SetPowerState, ADC_GetCurrentPowerState, ADC_GetTargetPowerState, ADC_PreparePowerState, ADC_Main_PowerTransitionManager), indicating if the HW offers low power state management.

NOTE: K1 platform does not support low power modes for ADC so this feature is always disabled.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.97 Parameter AdcPowerStateAsynchTransitionMode

Enables / disables support of the ADC Driver to the asynchronous power state transition. This feature is not implemented on this platform.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.98 Reference AdcEcucPartitionRef

Maps the ADC driver to zero or multiple ECUC partitions to make the driver API available in the according partition.

Property	Value
type	ECUC-REFERENCE-DEF
origin	AUTOSAR_ECUC
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/EcuC/EcucPartitionCollection/EcucPartition

4.99 Reference AdcKernelEcucPartitionRef

Maps the ADC kernel to zero or one ECUC partition to assign the driver kernel to a certain core. The ECUC partition referenced is a subset of the ECUC partitions where the ADC driver is mapped to.

Property	Value
type	ECUC-REFERENCE-DEF
origin	AUTOSAR_ECUC
lowerMultiplicity	0
upperMultiplicity	1
postBuildVariantMultiplicity	true
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
postBuildVariantValue	true
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
requiresSymbolicNameValue	False
destination	/AUTOSAR/EcucDefs/EcuC/EcucPartitionCollection/EcucPartition

4.100 Container AdcPowerStateConfig

Each instance of this parameter defines a power state and the callback to be called when this power state is reached.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	0
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE

4.101 Parameter AdcPowerState

Each instance of this parameter describes a different power state

supported by the ADC HW. It should be defined by the HW supplier and

used by the ADCDriver to reference specific HW configurations which set

the ADC HW module in the referenced power state. At least the power mode

corresponding to full power state shall be always configured.

This parameter shall only be configured if the parameter AdcLowPowerStatesSupport is set to true.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	true
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	0
max	18446744073709551615
min	0

4.102 Parameter AdcPowerStateReadyCbkRef

Each instance of this parameter contains a reference to a power mode callback defined in a CDD or IoHwAbs component.

This parameter shall only be configured if the parameter AdcLowPowerStatesSupport is set to true

Property	Value
type	ECUC-FUNCTION-NAME-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	NULL_PTR

4.103 Container AdcInterrupt

Selects whether the interrupt for each ADC Unit will be enabled. These settings are used for optimizing the code size by removing the interrupt handling code for interrupts that are not needed. .

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	Infinite
postBuildVariantMultiplicity	false
multiplicityConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE

4.104 Parameter AdcInterruptSource

The name of the interrupt.

Note: Implementation Specific Parameter.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	ADC0_COCO
literals	['ADC0_COCO', 'ADC1_COCO']

4.105 Parameter AdcInterruptEnable

Adds / removes the interrupt handling routine from the ADC driver code.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.106 Container AdcPublishedInformation

Additional published parameters not covered by CommonPublishedInformation container.

Note that these parameters do not have any configuration class setting, since they are published information.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.107 Parameter AdcChannelValueSigned

Information whether the result value of the ADC driver has sign information (true) or not (false). If the result shall be interpreted as signed value it shall apply to C-language rules.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	false

4.108 Parameter AdcGroupFirstChannelFixed

Information whether the first channel of an ADC Channel group can be configured (false) or is fixed (true) to a value determined by the ADC HW Unit.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	false

4.109 Parameter AdcMaxChannelResolution

Maximum Channel resolution in bits (does not specify accuracy).

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	AUTOSAR_ECUC
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	12
max	63
min	1

4.110 Container CommonPublishedInformation

Common container, aggregated by all modules. It contains published information about vendor and versions.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.111 Parameter ArReleaseMajorVersion

Major version number of AUTOSAR specification on which the appropriate implementation is based on.

Property	Value
type	ECUC-INTEGER-PARAM-DEF

Property	Value
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	4
max	4
min	4

4.112 Parameter ArReleaseMinorVersion

Minor version number of AUTOSAR specification on which the appropriate implementation is based on.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	4
max	4
min	4

4.113 Parameter ArReleaseRevisionVersion

Revision version number of AUTOSAR specification on which the appropriate implementation is based on.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false

Property	Value
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	0
max	0
min	0

4.114 Parameter ModuleId

Module ID of this module from Module List.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	123
max	123
min	123

4.115 Parameter SwMajorVersion

Major version number of the vendor specific implementation of the module. The numbering is vendor specific.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1

Property	Value
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	1
max	1
min	1

4.116 Parameter SwMinorVersion

Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	0
max	0
min	0

4.117 Parameter SwPatchVersion

Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A

Property	Value
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	1
max	1
min	1

4.118 Parameter VendorApiInfix

In driver modules which can be instantiated several times on a single ECU, BSW00347 requires that the name of APIs is extended by the VendorId and a vendor specific name.

This parameter is used to specify the vendor specific name. In total, the implementation specific name is generated as follows:

<ModuleName>_>VendorId>_<VendorApiInfix>.

E.g. assuming that the VendorId of the implementor is 123 and the implementer chose a VendorApiInfix of "v11r456" a api name Can_Write defined in the SWS will translate to Can_123_v11r456Write.

This parameter is mandatory for all modules with upper multiplicity > 1. It shall not be used for modules with upper multiplicity =1.

Property	Value
type	ECUC-STRING-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	

4.119 Parameter VendorId

Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PUBLISHED-INFORMATION
	VARIANT-PRE-COMPILE: PUBLISHED-INFORMATION
defaultValue	43
max	43
min	43

4.120 Container AutosarExt

Autosar Extension API settings.

Included subcontainers:

- None

Property	Value
type	ECUC-PARAM-CONF-CONTAINER-DEF
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A

4.121 Parameter AdcTimeoutMethod

Configures the timeout method for Adc.

Based on this selection a certain timeout method from OsIf will be used in the driver.

Note: If OSIF_COUNTER_SYSTEM or OSIF_COUNTER_CUSTOM are selected make sure the corresponding timer is enabled in OsIf General configuration.

Note: Implementation Specific Parameter.

Property	Value
type	ECUC-ENUMERATION-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	OSIF_COUNTER_DUMMY
literals	['OSIF_COUNTER_DUMMY', 'OSIF_COUNTER_SYSTEM', 'OSIF_COU↩ NTER_CUSTOM']

4.122 Parameter AdcTimeoutVal

The timeout is used for preventing endless loops as resulted from driver FMEA analysis.

The hardware failure mode which is preventing, is potential cases with frozen peripheral status used for driver synchronization.

The timeout is used as escape for avoidance of endless loops. For more details please refer to driver FMEA.

Property	Value
type	ECUC-INTEGER-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	100000
max	4294967295
min	0

4.123 Parameter AdcIpDevErrorDetect

This parameter Enables / Disables development error detection for Adc IPL module.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.124 Parameter PdbIpDevErrorDetect

This parameter Enables / Disables development error detection for Pdb.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.125 Parameter AdcMulticoreSupport

This parameter globally enables the possibility to support multicore. If this parameter is enabled, at least one EcucPartition needs to be defined (in all variants).

NoteThis is not supported on this platform.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.126 Parameter AdcEnableGroupDependentChannelNames

This is used to generate ADC symbolic names, that depend also on the ADC group

to which each ADC channel is mapped. The generated symbolic name will be something

like:

#define "ADC_GroupName"_"ADC_ChannelName" "Channel index value",

where "Channel index value" is the channel index in the current group.

Channel indexes in each group are generated to allow result buffer access by symbolic names.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.127 Parameter AdcBypassAbortChainCheck

Bypass the delay introduced to check if an aborted conversion chain has stopped.

This increases ADC driver performance at the cost of HW-SW coherency no longer being guaranteed.

The user must make sure he does not call an ADC service before the hardware reaches the correct state.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.128 Parameter AdcConvTimeOnce

Implementation Specific Parameter.

Enable/Disable one time setting of the registers.

If Enabled, the setting of the conversion time registers will be done only once in Adc_Init() function

for the configured hardware unit.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.129 Parameter AdcOptimizeOneShotHwTriggerConversions

Implementation Specific Parameter.

Enable/Disable The Adc driver optimization for HW Triggered groups, OneShot, Single access.

If Enabled, other types of groups cannot be configured in ADC driver and the code for interrupt routine / Dma notification will be optimized for speed.

Also, all groups must have configured channels no greater than number of available SC1 register.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.130 Parameter AdcOptimizeDmaStreamingGroups

Implementation Specific Parameter.

Enable/Disable The Adc driver enable Optimize DMA streaming groups for reducing the number of interrupts required for processing the conversions of Adc Groups that consist of one or more channels (depending on HW capabilities) and which are configured as ADC_ACCESS_MODE_STREAMING.

When this feature is enabled, only one interrupt will be raised after the completion of all stream conversions (as configured by AdcStreamingNumSamples parameter). An additional interrupt to be raised after half of the stream is converted shall also be configurable.

This feature is enabled if Adc Global Enable DMA Transfer from General/AutosarExt is also enabled.

Note:

- SetChannel(), Enable/DisableChannel() and Optimize one-shot hardware trigger cannot be use concurrently with this feature.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF

Property	Value
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.131 Parameter AdcContinuousWithoutInterrupt

This parameter globally enables the possibility to configure Adc Continuous Group Without Interrupt.

This is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.132 Parameter AdcEnableChDisableChApi

Enable/disable the Autosar Extension implementation api(s) Adc_EnableChannel() and Adc_DisableChannel() in ADC driver.

Notethis feature is not implemented on this platform.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP

Property	Value
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.133 Parameter AdcEnableInitialNotification

Enable/disable an extra notification to be called for each Adc Group conversion.

NoteThis feature is intended to be used together with Adc_SetChannel service. The initial notification can be used by the user application to call Adc_SetChannel API before ADC driver updates the hardware configuration for the next conversion.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.134 Parameter AdcEnableDmaTransferMode

This parameter globally enables the possibility to configure DMA transfer for ADC converted data. If this parameter is disabled then DMA handling code will be removed at pre-compile time and DMA transfer cannot be configure for any Adc unit in any variant. If this parameter is enabled then the DMA configuration code will not be removed.

NoteThis is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF

Property	Value
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.135 Parameter AdcEnableUserModeSupport

When this parameter is enabled, the Adc module will adapt to run from User Mode, by configuring REG_PROT for ADC IPs

Note: The Adc driver code can be executed at any time from both supervisor and user mode.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.136 Parameter AdcEnableSimSupplyMonitor

When this parameter is enabled, the Adc module allows to use the internal channels on SIM.

Note: If Adc runs from User Mode, AdcEnableUserModeSupport must be enabled in order to configure SIM register.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP

Property	Value
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.137 Parameter AdcEnablePdbInterChannelBackToBackSupport

When this parameter is enabled, PDB Inter-channel back to back feature can be configured in PdbHwUnit.

In this case, PDB CH0 and CH1 will be in back to back acknowledgement connections as a ring (E.g: PDB0 CH 0 pre-trigger 0 ->... -> PDB0 CH 0 pre-trigger 7 -> PDB0 CH 1 pre-trigger 0 -> .... -> PDB0 CH 1 pre-trigger 7 -> PDB0 CH 0 pre-trigger 0)

Note: If Pdb runs from User Mode, AdcEnableUserModeSupport must be enabled in order to configure SIM register.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.138 Parameter AdcEnableSetChannel

If this parameter has been configured to "TRUE", the Autosar Extension function "Adc_SetChannel()" shall be accessible, otherwise this function shall be removed from the code.

NoteThis is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-PRE-COMPILE: PRE-COMPILE
	VARIANT-POST-BUILD: PRE-COMPILE
defaultValue	false

4.139 Parameter AdcEnableDualClockMode

Adds/removes the Dual Clock mode service Adc_SetClockMode from the code.

Also it enables the Programming of Conversion Timing registers in Adc_SetClockMode.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.140 Parameter AdcEnableCalibration

If this parameter has been configured to "TRUE", the Autosar Extension function "Adc_Calibrate()" shall be accessible, otherwise this function shall be removed from the code.

NoteThis is an Implementation Specific Parameter.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF

Property	Value
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.141 Parameter AdcEnableReadRawDataApi

When this parameter is enabled, the Api for reading the raw result data from an ADC unit is available to use at runtime.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

4.142 Parameter AdcEnableGroupStreamingResultReorder

When this parameter is enabled, the adc results can be arranged as multiple sets of group result buffer if AdcStreamResultGrou is enabled for that selected group.

E.g: for a group with channels {CH1 CH5 CH7} the resulting stream buffer shall be:

{ CH1, CH5, CH7, CH1, CH5, CH7, CH1, CH5, CH7}

instead of

{ CH1, CH1, CH1, CH5, CH5, CH5, CH7, CH7, CH7} like supported by AUTOSAR standard.

Apply only for ADC_ACCESS_MODE_STREAMING Access Mode.

Property	Value
type	ECUC-BOOLEAN-PARAM-DEF
origin	NXP
symbolicNameValue	false
lowerMultiplicity	1
upperMultiplicity	1
postBuildVariantMultiplicity	N/A
multiplicityConfigClasses	N/A
postBuildVariantValue	false
valueConfigClasses	VARIANT-POST-BUILD: PRE-COMPILE
	VARIANT-PRE-COMPILE: PRE-COMPILE
defaultValue	false

Chapter 5

Module Index

5.1 Software Specification

Here is a list of all modules:

Chapter 6

Module Documentation

6.1 Adc driver

6.1.1 Detailed Description Adc HLD.

Adc Autosar High Level Driver.

Data Structures

- struct Adc_ValidationResultType
  Structure for validation results. More...
- struct Adc_GroupStatusType
  Structure for group status. More...
- struct Adc_UnitStatusType
  Structure for hardware unit status. More...
- struct Adc_ConfigType
  Structure for ADC configuration. More...

Macros

- #define ADC_E_UNINIT
  API service used without Adc module initialization.
- #define ADC_E_BUSY
  Adc module is busy with a running operation.
- #define ADC_E_IDLE
  Adc module is in idle state.
- #define ADC_E_ALREADY_INITIALIZED
  The ADC module is already initialized.
- #define ADC_E_PARAM_CONFIG
  The ADC module is not properly configured.
- #define ADC_E_PARAM_POINTER
  API service is called using an invalid pointer (e.g. the pointer should not be NULL).

- #define ADC_E_PARAM_GROUP

  API service used with an invalid ADC group.
- #define ADC_E_WRONG_CONV_MODE

  API service used with an invalid ADC Conversion Mode.
- #define ADC_E_WRONG_TRIGG_SRC

  API service used with an invalid ADC Trigger Source.
- #define ADC_E_NOTIF_CAPABILITY

  Check the notification capability of a group.
- #define ADC_E_BUFFER_UNINIT

  API service used without initializing the buffer.
- #define ADC_E_QUEUE_FULL

  The Adc_StartGroupConversion and Adc_EnableHardwareTrigger services can not queue another conversion (queue is full)
- #define ADC_E_PARAM_UNIT

  API service called using a wrong ADC unit.
- #define ADC_E_INVALID_CLOCK_MODE

  Adc_SetClockMode service called using an invalid clock mode.
- #define ADC_E_PARAM_CHANNEL

  Adc_SetChannel service called using an invalid channel list.
- #define ADC_E_TIMEOUT

  An error occurred if the timeout counter variable has expired when checking status flags.
- #define ADC_INIT_ID

  API service ID for Adc_Init function.
- #define ADC_DEINIT_ID

  API service ID for Adc_DeInit function.
- #define ADC_STARTGROUPCONVERSION_ID

  API service ID for Adc_StartGroupConversion function.
- #define ADC_STOPGROUPCONVERSION_ID

  API service ID for Adc_StopGroupConversion function.
- #define ADC_VALUEREADGROUP_ID

  API service ID for Adc_ReadGroup function.
- #define ADC_ENABLEHARDWARETRIGGER_ID

  API service ID for Adc_EnableHardwareTrigger function.
- #define ADC_DISABLEHARDWARETRIGGER_ID

  API service ID for Adc_DisableHardwareTrigger function.
- #define ADC_ENABLEGROUPNOTIFICATION_ID

  API service ID for Adc_EnableGroupNotification function.
- #define ADC_DISABLEGROUPNOTIFICATION_ID

  API service ID for Adc_DisableGroupNotification function.
- #define ADC_GETGROUPSTATUS_ID

  API service ID for Adc_GetGroupStatus function.
- #define ADC_GETVERSIONINFO_ID

  API service ID for Adc_GetVersionInfo function.
- #define ADC_GETSTREAMLASTPOINTER_ID

  API service ID for Adc_GetStreamLastPointer function.
- #define ADC_SETUPRESULTBUFFER_ID

  API service ID for Adc_SetupResultBuffer function.

- #define ADC_SETCLOCKMODE_ID
  API service ID for Adc_SetClockMode function.
- #define ADC_CALIBRATE_ID
  API service ID for Adc_Calibrate function.
- #define ADC_SETCHANNEL_ID
  API service ID for Adc_SetChannel function.

Types Reference

- typedef void(∗ Adc_NotifyType) (void)
  Notification function pointer definition.
- typedef uint8 Adc_ResolutionType
  channel resolution in number of bits
- typedef Adc_ChannelType Adc_GroupDefType
  definition of channels in a group
- typedef uint8 Adc_PrescaleType
  clock prescaler factor
- typedef uint8 Adc_SamplingTimeType
  sampling time
- typedef uint16 Adc_StreamNumSampleType
  Number of samples of a streaming conversion buffer.

Enum Reference

- enum Adc_GlobalStateType
  ADC driver status.
- enum Adc_GroupConversionStateType
  ADC group already converted type.
- enum Adc_GroupAccessModeType
  Adc group access Mode.
- enum Adc_GroupReplacementType
  Adc group replacement.
- enum Adc_StreamBufferModeType
  Adc group streaming buffer mode.
- enum Adc_StatusType
  ADC group status.
- enum Adc_NotificationType
  ADC group notification.
- enum Adc_HwTriggerSignalType
  Adc hardware trigger edge.
- enum Adc_TriggerSourceType
  Adc hardware trigger source.
- enum Adc_HwTriggeringType
  Adc Hardware trigger.

Function Reference

- void Adc_Init (const Adc_ConfigType *ConfigPtr)

  Initializes the ADC hardware unit and the driver.
- Std_ReturnType Adc_SetupResultBuffer (Adc_GroupType Group, Adc_ValueGroupType *const Data↩ BufferPtr)

  Initializes the group specific ADC result buffer pointer as configured to point to the pDataBufferPtr address which is passed as parameter.
- void Adc_DeInit (void)

  Returns all ADC HW Units to a state comparable to their power on reset state.
- void Adc_StartGroupConversion (Adc_GroupType Group)

  Starts the conversion of all channels of the requested ADC Channel group.
- void Adc_StopGroupConversion (Adc_GroupType Group)

  Stops the conversion of all channels of the requested ADC Channel group.
- Std_ReturnType Adc_ReadGroup (Adc_GroupType Group, Adc_ValueGroupType *DataBufferPtr)

  Reads the group conversion results.
- void Adc_ReadRawData (Adc_HwUnitType Unit, const Adc_ChannelType *const ChansArray, uint8 Num↩ Items, Adc_ValueGroupType *const DataBufferPtr)

  Read the raw result data from an ADC unit.
- void Adc_EnableHardwareTrigger (Adc_GroupType Group)

  Enables the hardware trigger for the requested ADC Channel group.
- void Adc_DisableHardwareTrigger (Adc_GroupType Group)

  Disables the hardware trigger for the requested ADC Channel group.
- void Adc_EnableGroupNotification (Adc_GroupType Group)

  Enables the notification mechanism for the requested ADC channel group.
- void Adc_DisableGroupNotification (Adc_GroupType Group)

  Disables the notification mechanism for the requested ADC channel group.
- Adc_StatusType Adc_GetGroupStatus (Adc_GroupType Group)

  Returns the conversion status of the requested ADC Channel group.
- Adc_StreamNumSampleType Adc_GetStreamLastPointer (Adc_GroupType Group, Adc_ValueGroupType **PtrToSamplePtr)

  Returns the number of valid samples per channel.
- void Adc_GetVersionInfo (Std_VersionInfoType *versioninfo)

  Returns the version information of this module.
- void Adc_Calibrate (Adc_HwUnitType Unit, Adc_CalibrationStatusType *pStatus)

  Executes high accuracy calibration of a ADC HW unit.
- Std_ReturnType Adc_SetClockMode (Adc_SelectPrescalerType Prescaler)

  Set the ADC clock prescaler if available and modify the conversion timings.
- void Adc_SetChannel (Adc_GroupType Group, const Adc_GroupDefType *Channel, const uint16 *Delays, uint32 ChannelUpdateMask, Adc_ChannelIndexType NumberOfChannel)

  Function to dynamic handling of ADC channels list for Adc channel group.

Variables

- const Adc_ConfigType * Adc_apxCfgPtr [(1U)]

  Used to point the configuration structure.

6.1.2 Data Structure Documentation

6.1.2.1 struct Adc_ValidationResultType

Structure for validation results.

This structure contains the validation information

Definition at line 286 of file Adc_Types.h.

Data Fields

Type	Name	Description
boolean	EndValidations	Signal if validation ended.
Std_ReturnType	ValidParams	Return status.

6.1.2.2 struct Adc_GroupStatusType

Structure for group status.

This structure contains the group status information.

Definition at line 297 of file Adc_Types.h.

Data Fields

Type	Name	Description
volatile Adc_StatusType	Conversion	Group status.
volatile Adc_GroupConversionStateType	AlreadyConverted	Group was previously converted or not.
Adc_HwTriggeringType	HwTriggering	hw trigger enabled/disabled
Adc_NotificationType	Notification	notification enabled/disabled
volatile Adc_StreamNumSampleType	ResultIndex	index into streaming buffer that is currently being filled
Adc_ValueGroupType *	ResultsBufferPtr	Pointer to user result buffer array.
Adc_ChannelIndexType	CurrentChannel	Current channel in use.
volatile boolean	LimitCheckFailed	check limit check fail

6.1.2.3 struct Adc_UnitStatusType

Structure for hardware unit status.

This structure contains the HW unit status information.

Definition at line 323 of file Adc_Types.h.

Data Fields

Type	Name	Description
volatile Adc_QueueIndexType	SwNormalQueueIndex	Filled slots in the queue.
volatile Adc_GroupType	SwNormalQueue[(1U)]	Queued groups indexes, always executing Queue[0].
volatile Adc_GroupType	OngoingHwGroup	Ongoing hardware group ID.
uint8	Sc1Used	

6.1.2.4 struct Adc_ConfigType

Structure for ADC configuration.

Data structure containing the set of configuration parameters required for initializing the ADC Driver.

SWS_Adc_00505

Definition at line 442 of file Adc_Types.h.

Data Fields

- const Adc_GroupConfigurationType * GroupsPtr
  Group configurations.
- Adc_GroupType GroupCount
  Total number of groups.
- const uint16 * GroupIdToIndexMapPtr
  Miscellaneous configuration parameters.
- uint32 CoreId
  Configuration CoreID.
- const uint8 AssignedPartitionCount
  Number of Partition.

6.1.2.4.1 Field Documentation

6.1.2.4.1.1 GroupsPtr `const Adc_GroupConfigurationType* GroupsPtr`

Group configurations.

Definition at line 447 of file Adc_Types.h.

6.1.2.4.1.2 GroupCount `Adc_GroupType GroupCount`

Total number of groups.

Definition at line 449 of file Adc_Types.h.

6.1.2.4.1.3 GroupIdToIndexMapPtr `const uint16* GroupIdToIndexMapPtr`

Miscellaneous configuration parameters.

Definition at line 451 of file Adc_Types.h.

6.1.2.4.1.4 CoreId `uint32 CoreId`

Configuration CoreID.

Assigned Partition

Definition at line 453 of file Adc_Types.h.

6.1.2.4.1.5 AssignedPartitionCount `const uint8 AssignedPartitionCount`

Number of Partition.

<

Definition at line 457 of file Adc_Types.h.

6.1.3 Macro Definition Documentation

6.1.3.1 ADC_E_UNINIT

```
#define ADC_E_UNINIT
```

API service used without Adc module initialization.

Development errors. The following errors shall be detectable by the ADC module depending on its configuration (development / production mode).

All error codes

Definition at line 133 of file Adc.h.

6.1.3.2 ADC_E_BUSY

```
#define ADC_E_BUSY
```

Adc module is busy with a running operation.

Definition at line 138 of file Adc.h.

6.1.3.3 ADC_E_IDLE

```
#define ADC_E_IDLE
```

Adc module is in idle state.

Definition at line 143 of file Adc.h.

6.1.3.4 ADC_E_ALREADY_INITIALIZED

```
#define ADC_E_ALREADY_INITIALIZED
```

The ADC module is already initialized.

Definition at line 148 of file Adc.h.

6.1.3.5 ADC_E_PARAM_CONFIG

```
#define ADC_E_PARAM_CONFIG
```

The ADC module is not properly configured.

Definition at line 153 of file Adc.h.

6.1.3.6 ADC_E_PARAM_POINTER

```
#define ADC_E_PARAM_POINTER
```

API service is called using an invalid pointer (e.g. the pointer should not be NULL).

Definition at line 158 of file Adc.h.

6.1.3.7 ADC_E_PARAM_GROUP

```
#define ADC_E_PARAM_GROUP
```

API service used with an invalid ADC group.

Definition at line 163 of file Adc.h.

6.1.3.8 ADC_E_WRONG_CONV_MODE

```
#define ADC_E_WRONG_CONV_MODE
```

API service used with an invalid ADC Conversion Mode.

Definition at line 168 of file Adc.h.

6.1.3.9 ADC_E_WRONG_TRIGG_SRC

```
#define ADC_E_WRONG_TRIGG_SRC
```

API service used with an invalid ADC Trigger Source.

Definition at line 173 of file Adc.h.

6.1.3.10 ADC_E_NOTIF_CAPABILITY

```
#define ADC_E_NOTIF_CAPABILITY
```

Check the notification capability of a group.

Definition at line 178 of file Adc.h.

6.1.3.11 ADC_E_BUFFER_UNINIT

```
#define ADC_E_BUFFER_UNINIT
```

API service used without initializing the buffer.

Definition at line 183 of file Adc.h.

6.1.3.12 ADC_E_QUEUE_FULL

```
#define ADC_E_QUEUE_FULL
```

The Adc_StartGroupConversion and Adc_EnableHardwareTrigger services can not queue another conversion (queue is full)

Definition at line 211 of file Adc.h.

6.1.3.13 ADC_E_PARAM_UNIT

```
#define ADC_E_PARAM_UNIT
```

API service called using a wrong ADC unit.

Definition at line 248 of file Adc.h.

6.1.3.14 ADC_E_INVALID_CLOCK_MODE

```
#define ADC_E_INVALID_CLOCK_MODE
```

Adc_SetClockMode service called using an invalid clock mode.

Definition at line 265 of file Adc.h.

6.1.3.15 ADC_E_PARAM_CHANNEL

```
#define ADC_E_PARAM_CHANNEL
```

Adc_SetChannel service called using an invalid channel list.

Definition at line 272 of file Adc.h.

6.1.3.16 ADC_E_TIMEOUT

```
#define ADC_E_TIMEOUT
```

An error occurred if the timeout counter variable has expired when checking status flags.

Definition at line 278 of file Adc.h.

6.1.3.17 ADC_INIT_ID

```
#define ADC_INIT_ID
```

API service ID for Adc_Init function.

All AUTOSAR API's service IDs

Definition at line 303 of file Adc.h.

6.1.3.18 ADC_DEINIT_ID

```
#define ADC_DEINIT_ID
```

API service ID for Adc_DeInit function.

Definition at line 308 of file Adc.h.

6.1.3.19 ADC_STARTGROUPCONVERSION_ID

```
#define ADC_STARTGROUPCONVERSION_ID
```

API service ID for Adc_StartGroupConversion function.

Definition at line 313 of file Adc.h.

6.1.3.20 ADC_STOPGROUPCONVERSION_ID

```
#define ADC_STOPGROUPCONVERSION_ID
```

API service ID for Adc_StopGroupConversion function.

Definition at line 318 of file Adc.h.

6.1.3.21 ADC_VALUEREADGROUP_ID

```
#define ADC_VALUEREADGROUP_ID
```

API service ID for Adc_ReadGroup function.

Definition at line 323 of file Adc.h.

6.1.3.22 ADC_ENABLEHARDWARETRIGGER_ID

```
#define ADC_ENABLEHARDWARETRIGGER_ID
```

API service ID for Adc_EnableHardwareTrigger function.

Definition at line 328 of file Adc.h.

6.1.3.23 ADC_DISABLEHARDWARETRIGGER_ID

```
#define ADC_DISABLEHARDWARETRIGGER_ID
```

API service ID for Adc_DisableHardwareTrigger function.

Definition at line 333 of file Adc.h.

6.1.3.24 ADC_ENABLEGROUPNOTIFICATION_ID

```
#define ADC_ENABLEGROUPNOTIFICATION_ID
```

API service ID for Adc_EnableGroupNotification function.

Definition at line 338 of file Adc.h.

6.1.3.25 ADC_DISABLEGROUPNOTIFICATION_ID

```
#define ADC_DISABLEGROUPNOTIFICATION_ID
```

API service ID for Adc_DisableGroupNotification function.

Definition at line 343 of file Adc.h.

6.1.3.26 ADC_GETGROUPSTATUS_ID

```
#define ADC_GETGROUPSTATUS_ID
```

API service ID for Adc_GetGroupStatus function.

Definition at line 348 of file Adc.h.

6.1.3.27 ADC_GETVERSIONINFO_ID

```
#define ADC_GETVERSIONINFO_ID
```

API service ID for Adc_GetVersionInfo function.

Definition at line 353 of file Adc.h.

6.1.3.28 ADC_GETSTREAMLASTPOINTER_ID

```
#define ADC_GETSTREAMLASTPOINTER_ID
```

API service ID for Adc_GetStreamLastPointer function.

Definition at line 358 of file Adc.h.

6.1.3.29 ADC_SETUPRESULTBUFFER_ID

```
#define ADC_SETUPRESULTBUFFER_ID
```

API service ID for Adc_SetupResultBuffer function.

Definition at line 363 of file Adc.h.

6.1.3.30 ADC_SETCLOCKMODE_ID

```
#define ADC_SETCLOCKMODE_ID
```

API service ID for Adc_SetClockMode function.

All Autosar Extension API's service IDs NOTE: Parameters used when raising an error/exception

Definition at line 423 of file Adc.h.

6.1.3.31 ADC_CALIBRATE_ID

```
#define ADC_CALIBRATE_ID
```

API service ID for Adc_Calibrate function.

Definition at line 448 of file Adc.h.

6.1.3.32 ADC_SETCHANNEL_ID

```
#define ADC_SETCHANNEL_ID
```

API service ID for Adc_SetChannel function.

Definition at line 485 of file Adc.h.

6.1.4 Types Reference

6.1.4.1 Adc_NotifyType

```
typedef void(* Adc_NotifyType) (void)
```

Notification function pointer definition.

Definition at line 253 of file Adc_Types.h.

6.1.4.2 Adc_ResolutionType

```
typedef uint8 Adc_ResolutionType
```

channel resolution in number of bits

Definition at line 257 of file Adc_Types.h.

6.1.4.3 Adc_GroupDefType

```
typedef Adc_ChannelType Adc_GroupDefType
```

definition of channels in a group

Definition at line 267 of file Adc_Types.h.

6.1.4.4 Adc_PrescaleType

```
typedef uint8 Adc_PrescaleType
```

clock prescaler factor

Definition at line 271 of file Adc_Types.h.

6.1.4.5 Adc_SamplingTimeType

```
typedef uint8 Adc_SamplingTimeType
```

sampling time

Definition at line 275 of file Adc_Types.h.

6.1.4.6 Adc_StreamNumSampleType

```
typedef uint16 Adc_StreamNumSampleType
```

Number of samples of a streaming conversion buffer.

Definition at line 279 of file Adc_Types.h.

6.1.5 Enum Reference

6.1.5.1 Adc_GlobalStateType

```
enum Adc_GlobalStateType
```

ADC driver status.

Used to differentiate if ADC driver is already uninit, during init or already initialized or not.

Enumerator

ADC_STATE_UNINIT	Adc driver uninitialized.
ADC_STATE_BUSY	Adc driver busy.
ADC_STATE_IDLE	Adc driver idle.

Definition at line 120 of file Adc_Types.h.

6.1.5.2 Adc_GroupConversionStateType

```
enum Adc_GroupConversionStateType
```

ADC group already converted type.

Used to differentiate if group is already converted or not.

Enumerator

ADC_NOT_YET_CONVERTED	Group not yet converted.
ADC_ALREADY_CONVERTED	Group is already converted.

Definition at line 133 of file Adc_Types.h.

6.1.5.3 Adc_GroupAccessModeType

enum Adc_GroupAccessModeType

Adc group access Mode.

Used for value received by Tressos interface configuration.

SWS_Adc_00528

Enumerator

ADC_ACCESS_MODE_SINGLE	Single access mode.
ADC_ACCESS_MODE_STREAMING	Streaming access mode.

Definition at line 146 of file Adc_Types.h.

6.1.5.4 Adc_GroupReplacementType

enum Adc_GroupReplacementType

Adc group replacement.

Used for value received by Tressos interface configuration.

SWS_Adc_00523

Enumerator

ADC_GROUP_REPL_ABORT_RESTART	Abort and restart of group.
ADC_GROUP_REPL_SUSPEND_RESUME	Suspend and resuming of group.

Definition at line 159 of file Adc_Types.h.

6.1.5.5 Adc_StreamBufferModeType

enum Adc_StreamBufferModeType

Adc group streaming buffer mode.

Used for value received by Tressos interface configuration.

SWS_Adc_00519

Enumerator

ADC_STREAM_BUFFER_LINEAR	Linear streaming.
ADC_STREAM_BUFFER_CIRCULAR	Circular streaming.

Definition at line 172 of file Adc_Types.h.

6.1.5.6 Adc_StatusType

enum Adc_StatusType

ADC group status.

ADC group enumeration type.

SWS_Adc_00513

Enumerator

ADC_IDLE	Group is in IDLE state.
ADC_BUSY	Group is in BUSY state.
ADC_COMPLETED	Group is in COMPLETED state.
ADC_STREAM_COMPLETED	Group is in STREAM_COMPLETED state.

Definition at line 185 of file Adc_Types.h.

6.1.5.7 Adc_NotificationType

enum Adc_NotificationType

ADC group notification.

Indicates if notification is enabled for the group.

Enumerator

ADC_NOTIFICATION_DISABLED	Notification is disabled.
ADC_NOTIFICATION_ENABLED	Notification is enabled.

Definition at line 198 of file Adc_Types.h.

6.1.5.8 Adc_HwTriggerSignalType

enum Adc_HwTriggerSignalType

Adc hardware trigger edge.

Used for value received by Tressos interface configuration.

SWS_Adc_00520

Enumerator

ADC_HW_TRIG_RISING_EDGE	Rising edge.
ADC_HW_TRIG_FALLING_EDGE	Falling edge.
ADC_HW_TRIG_BOTH_EDGES	falling and rising edge

Definition at line 212 of file Adc_Types.h.

6.1.5.9 Adc_TriggerSourceType

enum Adc_TriggerSourceType

Adc hardware trigger source.

Used for value received by Tressos interface configuration.

SWS_Adc_00514

Enumerator

ADC_TRIGG_SRC_SW	Software triggered.
ADC_TRIGG_SRC_HW	Hardware triggered.

Definition at line 226 of file Adc_Types.h.

6.1.5.10 Adc_HwTriggeringType

```
enum Adc_HwTriggeringType
```

Adc Hardware trigger.

Indicates if hardware trigger is enabled for group.

Enumerator

ADC_HWTRIGGER_DISABLED	Hardware trigger is disabled.
ADC_HWTRIGGER_ENABLED	Hardware trigger is enabled.

Definition at line 241 of file Adc_Types.h.

6.1.6 Function Reference

6.1.6.1 Adc_Init()

```
void Adc_Init (
            const Adc_ConfigType * ConfigPtr )
```

Initializes the ADC hardware unit and the driver.

This function will initialize both the ADC HW unit and the driver structures.

Parameters

in	*ConfigPtr*	Pointer to configuration set in Variant PB (Variant PC requires a NULL_PTR).

Returns

void

6.1.6.2 Adc_SetupResultBuffer()

```
Std_ReturnType Adc_SetupResultBuffer (
            Adc_GroupType Group,
            Adc_ValueGroupType *const DataBufferPtr )
```

Initializes the group specific ADC result buffer pointer as configured to point to the pDataBufferPtr address which is passed as parameter.

Initializes ADC driver with the group specific result buffer start address where the conversion results will be stored. The application has to ensure that the application buffer, where pDataBufferPtr points to, can hold all the conversion results of the specified group. The initialization with Adc_SetupResultBuffer is required after reset, before a group conversion can be started.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.
in	*pDataBufferPtr*	Pointer to result data buffer

Returns

Std_ReturnType Standard return type. E_OK: Result buffer pointer initialized correctly. E_NOT_OK: Operation failed or development error occurred.

6.1.6.3 Adc_DeInit()

```
void Adc_DeInit (
            void  )
```

Returns all ADC HW Units to a state comparable to their power on reset state.

Returns all ADC HW Units to a state comparable to their power on reset state, and de-initialize the ADC driver.

Returns

void

6.1.6.4 Adc_StartGroupConversion()

```
void Adc_StartGroupConversion (
            Adc_GroupType Group )
```

Starts the conversion of all channels of the requested ADC Channel group.

This function will start the SW conversion of all channels of the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.5 Adc_StopGroupConversion()

```
void Adc_StopGroupConversion (
            Adc_GroupType Group )
```

Stops the conversion of all channels of the requested ADC Channel group.

This function will stop the SW conversion of all channels of the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.6 Adc_ReadGroup()

```
Std_ReturnType Adc_ReadGroup (
            Adc_GroupType Group,
            Adc_ValueGroupType * DataBufferPtr )
```

Reads the group conversion results.

Reads the group conversion results of the last completed conversion round of the requested group and stores the channel values starting at the pDataBufferPtr address. The group channel values are stored in ascending channel number order (in contrast to the storage layout of the result buffer if streaming access is configured).

Parameters

in	*Group*	Numeric ID of requested ADC Channel group.
in	*pDataBufferPtr*	ADC results of all channels of the selected group are stored in the data buffer addressed with the pointer.

Returns

Std_ReturnType Standard return type. E_OK: results are available and written to the data buffer. E_NO↩ T_OK: no results are available or development error occurred.

6.1.6.7 Adc_ReadRawData()

```
void Adc_ReadRawData (
             Adc_HwUnitType Unit,
             const Adc_ChannelType *const ChansArray,
             uint8 NumItems,
             Adc_ValueGroupType *const DataBufferPtr )
```

Read the raw result data from an ADC unit.

Read the raw result data from an ADC unit. Intended for reading ADC results directly from ADC registers and can eliminate surplus interrupts if there are more triggered measurements than FIFO length. Measured values remain in ADC result registers(user must ensure that they are not overwritten).

Parameters

in	*Unit*	Adc unit used. Recommended to use generated define for Adc Logical Unit Id.
in	*ChansArray*	List of channels for which results to be read
in	*NumItems*	Number of results to read
out	*DataBufferPtr*	Destination pointer in which the results will be written

Returns

void

6.1.6.8 Adc_EnableHardwareTrigger()

```
void Adc_EnableHardwareTrigger (
             Adc_GroupType Group )
```

Enables the hardware trigger for the requested ADC Channel group.

This function will enable the HW trigger source for the requested ADC channel group. This function does set the CTU register for all platform that have the CTU Hw Unit.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.9 Adc_DisableHardwareTrigger()

```
void Adc_DisableHardwareTrigger (
            Adc_GroupType Group )
```

Disables the hardware trigger for the requested ADC Channel group.

This function will disable the HW trigger source for the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.10 Adc_EnableGroupNotification()

```
void Adc_EnableGroupNotification (
            Adc_GroupType Group )
```

Enables the notification mechanism for the requested ADC channel group.

This function will enable the notification mechanism only for the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.11 Adc_DisableGroupNotification()

```
void Adc_DisableGroupNotification (
            Adc_GroupType Group )
```

Disables the notification mechanism for the requested ADC channel group.

This function will disable the notification mechanism only for the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

void

6.1.6.12 Adc_GetGroupStatus()

```
Adc_StatusType Adc_GetGroupStatus (
            Adc_GroupType Group )
```

Returns the conversion status of the requested ADC Channel group.

This function will return the conversion status of the requested ADC channel group.

Parameters

in	*Group*	Numeric ID of requested ADC channel group.

Returns

Adc_StatusType Conversion status for the requested group. ADC_IDLE in case of errors. conversion status in case of no errors.

6.1.6.13 Adc_GetStreamLastPointer()

```
Adc_StreamNumSampleType Adc_GetStreamLastPointer (
            Adc_GroupType Group,
            Adc_ValueGroupType ** PtrToSamplePtr )
```

Returns the number of valid samples per channel.

Returns the number of valid samples per channel, stored in the result buffer. Reads a pointer, pointing to a position in the group result buffer. With the pointer position, the results of all group channels of the last completed conversion round can be accessed. With the pointer and the return value, all valid group conversion results can be accessed (the user has to take the layout of the result buffer into account).

Parameters

in	*Group*	Numeric ID of requested ADC channel group.
out	*PtrToSamplePtr*	Pointer to result buffer pointer.

Returns

Adc_StreamNumSampleType Number of valid samples per channel. 0 in case of errors. >0 Number of valid samples per channel.

6.1.6.14 Adc_GetVersionInfo()

```
void Adc_GetVersionInfo (
            Std_VersionInfoType * versioninfo )
```

Returns the version information of this module.

Returns the version information of this module.

Parameters

out	*pVersionInfo*	Pointer to where to store the version information of this module. structure in case of no errors.

6.1.6.15 Adc_Calibrate()

```
void Adc_Calibrate (
            Adc_HwUnitType Unit,
            Adc_CalibrationStatusType * pStatus )
```

Executes high accuracy calibration of a ADC HW unit.

This function calibrates the ADC HW unit and updates calibration related registers

Parameters

in	*Unit*	Adc unit used. Recommended to use generated define for Adc Logical Unit Id
in	*pStatus*	Status of the ADC HW unit calibration and list of failed and passed tests.

Returns

void

6.1.6.16 Adc_SetClockMode()

```
Std_ReturnType Adc_SetClockMode (
            Adc_SelectPrescalerType Prescaler )
```

Set the ADC clock prescaler if available and modify the conversion timings.

This function sets the ADC clock prescaler (Analog clock frequency selector)

Parameters

in	*Prescaler*	Normal or Alternate mode.

Returns

Std_ReturnType Standard return type. E_OK: In case of successful settings. E_NOT_OK: In case of unsuccessful settings.

6.1.6.17 Adc_SetChannel()

```
void Adc_SetChannel (
            Adc_GroupType Group,
            const Adc_GroupDefType * Channel,
            const uint16 * Delays,
            uint32 ChannelUpdateMask,
            Adc_ChannelIndexType NumberOfChannel )
```

Function to dynamic handling of ADC channels list for Adc channel group.

Dynamic handling of ADC channels list. This function to dynamic handling of ADC channels list for Adc channel group.

Parameters

in	*Group*	Group Id.
in	*Channel*	Pointer to array of channels to be reconfigured for the group. Channel value is logical channel ID.
in	*Delays*	Pointer to array of delay value associated with array of channels to be reconfigured.
in	*ChannelUpdateMask*	Bitmask selecting which channels to be reconfigured.
in	*NumberOfChannel*	Number of channels in channels array.

Note

For platforms supporting delays (Only if ADC_IPW_DELAY_AVAILABLE == STD_ON): Delays:

- If NULL_PTR: channel delay values are not reconfigured.
- If group has configured only 1 delay: pointer to new delay value.
- If group has configured delay for each channel: array with new delay values - number of elements must be NumberOfChannel.

ChannelUpdateMask:

- Bitmask example: 0b0110 only reconfigures channels from positions 1 and 2.
- This bit mask can be used only if number of group channels are not greater than number of SC1 registers
- Last bit of this mask must be set for having interrupt if NumberOfChannel is different than number of configured channels.

6.1.7 Variable Documentation

6.1.7.1 Adc_apxCfgPtr

```
const Adc_ConfigType* Adc_apxCfgPtr[(1U)]  [extern]
```

Used to point the configuration structure.

6.2 Adc IPL

6.2.1 Detailed Description Adc HW module.

Adc IP layer hardware module.

Data Structures

- struct Adc_Ip_ChanConfigType

  Defines the channel configuration. More...
- struct Adc_Ip_ClockConfigType

  Defines the ADC clock configuration. More...
- struct Adc_Ip_ConfigType

  Defines the module configuration. More...
- struct Adc_Ip_StateStructType

  Structure used to store runtime info. More...

Types Reference

- typedef void Adc_Ip_ChanNotificationType(const uint8 ControlChanIdx)

  Defines the channel notification header.

Enum Reference

- enum Adc_Ip_StatusType

  ADC IP status return type.
- enum Adc_Ip_ClockSelType

  Clock divider selection.
- enum Adc_Ip_ResolutionType

  Conversion resolution selection.
- enum Adc_Ip_ClkSourceType

  Input clock source selection.
- enum Adc_Ip_AvgSelectType

  Hardware average selection.
- enum Adc_Ip_TrigType

  Trigger type selection.
- enum Adc_Ip_VoltageReferenceType

  Voltage reference selection.
- enum Adc_Ip_InputChannelType

  Enumeration of input channels assignable to a control channel.
  ***Note 0**: entries in this enum are affected by ::FEATURE_ADC_NUM_EXT_CHANS, which is device dependent and controlled from "device_name"_features.h file.*

Function Reference

- void Adc_Ip_Init (const uint32 Instance, const Adc_Ip_ConfigType *const Config)

  Initialize ADC module.
- void Adc_Ip_DeInit (const uint32 Instance)

  Deinitialize ADC module.
- void Adc_Ip_SetAveraging (const uint32 Instance, const boolean AvgEn, const Adc_Ip_AvgSelectType AvgSel)

  Configure averaging.
- void Adc_Ip_SetSampleTime (const uint32 Instance, const uint8 SampleTime)

  Configure sample time.
- void Adc_Ip_EnableDma (const uint32 Instance)

  Enable DMA.
- void Adc_Ip_DisableDma (const uint32 Instance)

  Disable DMA.
- void Adc_Ip_SetTriggerMode (const uint32 Instance, const Adc_Ip_TrigType TriggerMode)

  Switch between hardware and software trigger.
- void Adc_Ip_SetContinuousMode (const uint32 Instance, const boolean ContinuousModeEnable)

  Switch between continuous and one shot conversion mode.
- void Adc_Ip_SetResolution (const uint32 Instance, const Adc_Ip_ResolutionType Resolution)

  Set ADC module resolution.
- void Adc_Ip_SetClockMode (const uint32 Instance, const Adc_Ip_ClockConfigType *const Config)

  Set the ADC clock values.
- void Adc_Ip_ConfigChannel (const uint32 Instance, const Adc_Ip_ChanConfigType *const ChanConfig)

  Configure the selected control channel with the given configuration structure.
- Adc_Ip_StatusType Adc_Ip_SetDisabledChannel (const uint32 Instance, const uint8 ControlChanIdx, const boolean WithTimeout)

  Disable selected channel.
- void Adc_Ip_StartConversion (const uint32 Instance, Adc_Ip_InputChannelType InputChannel, const boolean InterruptEnable)

  Start a software triggered conversion.
- boolean Adc_Ip_GetConvActiveFlag (const uint32 Instance)

  Read and return conversion active flag status.
- boolean Adc_Ip_GetChanInterrupt (const uint32 Instance, const uint8 ControlChanIdx)

  Check if selected channel has interrupt set.
- boolean Adc_Ip_GetConvCompleteFlag (const uint32 Instance, const uint8 ControlChanIdx)

  Get the value of conversion complete flag of a channel.
- uint16 Adc_Ip_GetConvData (const uint32 Instance, const uint8 ControlChanIdx)

  Get the last result for the selected control channel.
- Adc_Ip_StatusType Adc_Ip_DoCalibration (const uint32 Instance)

  Perform calibration of the ADC module.
- Adc_Ip_StatusType Adc_Ip_ClearLatchedTriggers (const uint32 Instance)

  Clear latched triggers under processing.
- void Adc_Ip_EnableChannelNotification (const uint32 Instance, const uint8 ControlChanIdx)

  Enable channel notification.
- void Adc_Ip_DisableChannelNotification (const uint32 Instance, const uint8 ControlChanIdx)

  Disable channel notification.

- void Adc_Ip_ClearTrigErrReg (const uint32 Instance)

  Clear all trigger error flags.
- uint32 Adc_Ip_GetTrigErrReg (const uint32 Instance)

  Get all trigger error flags.
- uint32 Adc_Ip_GetDataAddress (const uint32 Instance, const uint8 Index)

  Return the address of the specified data register.
- Adc_Ip_StatusType Adc_Ip_GetChanData (const uint32 Instance, const Adc_Ip_InputChannelType Channel, uint16 *const Result)

  Get the last result for the selected control channel.
- void Adc_Ip_SetSupplyMonitoringEnable_TrustedCall (const boolean SupplyEnable)

  This function enable supply monitoring for the internal channels on SIM registers.
- void Adc_Ip_ConfigSupplyMonitoringChannel_TrustedCall (const uint32 SupplyChannel)

  This function configures the internal channels on on SIM registers.
- void Adc_Ip_ResetSupplyMonitoringChannel_TrustedCall (void)

  This function resets the muxing for ADC channel on SIM register to reset value.

6.2.2 Data Structure Documentation

6.2.2.1 struct Adc_Ip_ChanConfigType

Defines the channel configuration.

This structure is used to configure channels

Implements : Adc_Ip_ChanConfigType_Class

Definition at line 344 of file Adc_Ip_Types.h.

Data Fields

Type	Name	Description
uint8	ChnIdx	Control channel 0
Adc_Ip_InputChannelType	Channel	Selection of input channel for measurement
boolean	InterruptEnable	Enable interrupts for this channel

6.2.2.2 struct Adc_Ip_ClockConfigType

Defines the ADC clock configuration.

This structure is used to configure ADC clock

Implements : Adc_Ip_ClockConfigType_Class

Definition at line 360 of file Adc_Ip_Types.h.

Data Fields

Type	Name	Description
Adc_Ip_ClockSelType	ClockDivide	Selected clock
Adc_Ip_ClkSourceType	InputClock	Input clock source
uint8	SampleTime	Sample time in AD Clocks
boolean	AvgEn	Enable averaging functionality
Adc_Ip_AvgSelectType	AvgSel	Selection for number of samples used for averaging

6.2.2.3 struct Adc_Ip_ConfigType

Defines the module configuration.

This structure is used to configure the ADC module

Implements : Adc_Ip_ConfigType_Class

Definition at line 376 of file Adc_Ip_Types.h.

Data Fields

Type	Name	Description
Adc_Ip_ClockSelType	ClockDivide	Divider of the input clock for the ADC
Adc_Ip_ClockSelType	CalibrationClockDivide	Divider of the input clock for Calibration
Adc_Ip_ClkSourceType	InputClock	Input clock source
uint8	SampleTime	Sample time in AD Clocks
boolean	AvgEn	Enable averaging functionality
Adc_Ip_AvgSelectType	AvgSel	Selection for number of samples used for averaging
Adc_Ip_ResolutionType	Resolution	ADC resolution (8,10,12 bit)
Adc_Ip_TrigType	TriggerMode	ADC trigger mode (software, hardware) - affects only the first control channel
boolean	DmaEnable	Enable DMA for the ADC
Adc_Ip_VoltageReferenceType	VoltageRef	Voltage reference used
boolean	ContinuousConvEnable	Enable Continuous conversions
boolean	SupplyMonitoringEnable	Only available for ADC 0. Enable internal supply monitoring - enables measurement of ADC_IP_INPUTC↩ HAN_SUPPLY_ sources.
boolean	CompareEnable	Enable the compare feature
boolean	CompareGreaterThanEnable	Enable Greater-Than functionality
boolean	CompareRangeFuncEnable	Enable Range functionality
uint16	CompVal1	First Compare Value
uint16	CompVal2	Second Compare Value

Data Fields

Type	Name	Description
uint16	UsrGain	User-configurable gain
uint16	UsrOffset	User-configurable Offset (2's complement, subtracted from result)
uint8	NumChannels	User-configurable Number of Channels
const Adc_Ip_ChanConfigType *	ChannelConfigs	User-configurable channel configuration
Adc_Ip_ChanNotificationType *	ConversionCompleteNotification	Individual channel notification

6.2.2.4 struct Adc_Ip_StateStructType

Structure used to store runtime info.

This structure is used to store ADC runtime info

Implements : Adc_Ip_StateStructType_Class

Definition at line 421 of file Adc_Ip_Types.h.

Data Fields

Type	Name	Description
boolean	Init	Check if the driver was initialized.
Adc_Ip_ClockSelType	CalibrationClockDivide	Divider of the input clock for Calibration
Adc_Ip_ChanNotificationType *	ConversionCompleteNotification	Individual channel notification
Adc_Ip_InputChannelType	ChannelConfig[ADC_MAX_CHAN_COUNT]	Current hardware channel config

6.2.3 Types Reference

6.2.3.1 Adc_Ip_ChanNotificationType

```
typedef void Adc_Ip_ChanNotificationType(const uint8 ControlChanIdx)
```

Defines the channel notification header.

This header is used for channel notification callbacks. Note: the return paramter is the index of the control channel(numeric index of SC1x e.g. SC1A has index 0), not the input channel.

Implements : Adc_Ip_ChanNotificationType_Class

Definition at line 334 of file Adc_Ip_Types.h.

6.2.4 Enum Reference

6.2.4.1 Adc_Ip_StatusType

enum Adc_Ip_StatusType

ADC IP status return type.

This structure is used as return type

Implements : Adc_Ip_StatusType_Class

Enumerator

ADC_IP_STATUS_SUCCESS	Function completed successfully
ADC_IP_STATUS_ERROR	Function didn't complete successfully
ADC_IP_STATUS_TIMEOUT	Function operation timed out

Definition at line 103 of file Adc_Ip_Types.h.

6.2.4.2 Adc_Ip_ClockSelType

enum Adc_Ip_ClockSelType

Clock divider selection.

This structure is used to configure the converter input clock

Implements : Adc_Ip_ClockSelType_Class

Enumerator

ADC_IP_CLK_FULL_BUS	Input clock divided by 1.
ADC_IP_CLK_HALF_BUS	Input clock divided by 2.
ADC_IP_CLK_QUARTER_BUS	Input clock divided by 4.
ADC_IP_CLK_EIGHTH_BUS	Input clock divided by 8.

Definition at line 117 of file Adc_Ip_Types.h.

6.2.4.3 Adc_Ip_ResolutionType

enum Adc_Ip_ResolutionType

Conversion resolution selection.

Implements : Adc_Ip_ResolutionType_Class

Enumerator

ADC_IP_RESOLUTION_8BIT	8-bit resolution mode
ADC_IP_RESOLUTION_12BIT	12-bit resolution mode
ADC_IP_RESOLUTION_10BIT	10-bit resolution mode

Definition at line 130 of file Adc_Ip_Types.h.

6.2.4.4 Adc_Ip_ClkSourceType

enum Adc_Ip_ClkSourceType

Input clock source selection.

This structure is used to select the input clock source

Implements : Adc_Ip_ClkSourceType_Class

Enumerator

ADC_IP_CLK_ALT↩ _1	Input clock alternative 1.
ADC_IP_CLK_ALT↩ _2	Input clock alternative 2.
ADC_IP_CLK_ALT↩ _3	Input clock alternative 3.
ADC_IP_CLK_ALT↩ _4	Input clock alternative 4.

Definition at line 144 of file Adc_Ip_Types.h.

6.2.4.5 Adc_Ip_AvgSelectType

enum Adc_Ip_AvgSelectType

Hardware average selection.

This structure is used to select the number of conversions to average in order to get the conversion data.

Implements : Adc_Ip_AvgSelectType_Class

Enumerator

ADC_IP_AVG_4_CONV	4 conversions per conversion data
ADC_IP_AVG_8_CONV	8 conversions per conversion data
ADC_IP_AVG_16_CONV	16 conversions per conversion data
ADC_IP_AVG_32_CONV	32 conversions per conversion data

Definition at line 160 of file Adc_Ip_Types.h.

6.2.4.6 Adc_Ip_TrigType

`enum Adc_Ip_TrigType`

Trigger type selection.

Implements : Adc_Ip_TrigType_Class

Enumerator

ADC_IP_TRIGGER_SOFTWARE	Software trigger.
ADC_IP_TRIGGER_HARDWARE	Hardware trigger.

Definition at line 172 of file Adc_Ip_Types.h.

6.2.4.7 Adc_Ip_VoltageReferenceType

`enum Adc_Ip_VoltageReferenceType`

Voltage reference selection.

Implements : Adc_Ip_VoltageReferenceType_Class

Enumerator

ADC_IP_VOLTAGEREF_VREF	VrefH and VrefL as Voltage reference.
ADC_IP_VOLTAGEREF_VALT	ValtH and ValtL as Voltage reference.

Definition at line 231 of file Adc_Ip_Types.h.

6.2.4.8 Adc_Ip_InputChannelType

```
enum Adc_Ip_InputChannelType
```

Enumeration of input channels assignable to a control channel.
Note 0: entries in this enum are affected by ::FEATURE_ADC_NUM_EXT_CHANS, which is device dependent and controlled from *"device_name"_features.h* file.

Note 1: the actual number of external channels may differ between device packages and ADC instances. Reading a channel that is not connected externally, will return a random value within the range. Please refer to the Reference Manual for the maximum number of external channels for each device variant and ADC instance.

Note 2: ADC_IP_INPUTCHAN_SUPPLY_ select which internal supply channel to be measured. They are only available for ADC0 and measured internally via internal input channel 0. Please note that supply monitoring needs to be enabled separately via dedicated flag in adc_converter_config_t.

Implements : Adc_Ip_InputChannelType_Class

Enumerator

ADC_IP_INPUTCHAN_EXT0	External input channel 0
ADC_IP_INPUTCHAN_EXT1	External input channel 1
ADC_IP_INPUTCHAN_EXT2	External input channel 2
ADC_IP_INPUTCHAN_EXT3	External input channel 3
ADC_IP_INPUTCHAN_EXT4	External input channel 4
ADC_IP_INPUTCHAN_EXT5	External input channel 5
ADC_IP_INPUTCHAN_EXT6	External input channel 6
ADC_IP_INPUTCHAN_EXT7	External input channel 7
ADC_IP_INPUTCHAN_EXT8	External input channel 8
ADC_IP_INPUTCHAN_EXT9	External input channel 9
ADC_IP_INPUTCHAN_EXT10	External input channel 10
ADC_IP_INPUTCHAN_EXT11	External input channel 11
ADC_IP_INPUTCHAN_EXT12	External input channel 12
ADC_IP_INPUTCHAN_EXT13	External input channel 13
ADC_IP_INPUTCHAN_EXT14	External input channel 14
ADC_IP_INPUTCHAN_EXT15	External input channel 15
ADC_IP_INPUTCHAN_EXT16	External input channel 16
ADC_IP_INPUTCHAN_EXT17	External input channel 17
ADC_IP_INPUTCHAN_EXT18	External input channel 18
ADC_IP_INPUTCHAN_EXT19	External input channel 19
ADC_IP_INPUTCHAN_EXT20	External input channel 20
ADC_IP_INPUTCHAN_EXT21	External input channel 21
ADC_IP_INPUTCHAN_EXT22	External input channel 22
ADC_IP_INPUTCHAN_EXT23	External input channel 23
ADC_IP_INPUTCHAN_EXT24	External input channel 24
ADC_IP_INPUTCHAN_EXT25	External input channel 25

Enumerator

ADC_IP_INPUTCHAN_EXT26	External input channel 26
ADC_IP_INPUTCHAN_EXT27	External input channel 27
ADC_IP_INPUTCHAN_EXT28	External input channel 28
ADC_IP_INPUTCHAN_EXT29	External input channel 29
ADC_IP_INPUTCHAN_EXT30	External input channel 30
ADC_IP_INPUTCHAN_EXT31	External input channel 31
ADC_IP_INPUTCHAN_DISABLED	Channel disabled
ADC_IP_INPUTCHAN_INT0	Internal input channel 0
ADC_IP_INPUTCHAN_INT1	Internal input channel 1
ADC_IP_INPUTCHAN_INT2	Internal input channel 2
ADC_IP_INPUTCHAN_INT3	Internal input channel 3
ADC_IP_INPUTCHAN_TEMP	Temperature Sensor
ADC_IP_INPUTCHAN_BANDGAP	Band Gap
ADC_IP_INPUTCHAN_VREFH	Voltage Reference Select High
ADC_IP_INPUTCHAN_VREFL	Voltage Reference Select Low The following channels are measured via internal input channel 0
ADC_IP_INPUTCHAN_SUPPLY_VDD	Monitor internal supply 5 V input VDD supply.
ADC_IP_INPUTCHAN_SUPPLY_VDDA	Monitor internal supply 5 V input analog supply.
ADC_IP_INPUTCHAN_SUPPLY_VREFH	Monitor internal supply ADC reference supply.
ADC_IP_INPUTCHAN_SUPPLY_VDD_3V	Monitor internal supply 3.3 V oscillator regulator output.
ADC_IP_INPUTCHAN_SUPPLY_VDD_FLAS↩H_3V	Monitor internal supply 3.3 V flash regulator output.
ADC_IP_INPUTCHAN_SUPPLY_VDD_LV	Monitor internal supply 1.2 V core regulator output.

Definition at line 252 of file Adc_Ip_Types.h.

6.2.5 Function Reference

6.2.5.1 Adc_Ip_Init()

```
void Adc_Ip_Init (
            const uint32 Instance,
            const Adc_Ip_ConfigType *const Config )
```

Initialize ADC module.

This function initializes the ADC module by configuring all available features.

Parameters

in	*Instance*	- ADC instance number
in	*config*	- configuration struct pointer

Returns

void

6.2.5.2 Adc_Ip_DeInit()

```
void Adc_Ip_DeInit (
            const uint32 Instance )
```

Deinitialize ADC module.

This function resets the ADC internal registers to default values.

Parameters

in	*Instance*	- ADC instance number

Returns

void

6.2.5.3 Adc_Ip_SetAveraging()

```
void Adc_Ip_SetAveraging (
            const uint32 Instance,
            const boolean AvgEn,
            const Adc_Ip_AvgSelectType AvgSel )
```

Configure averaging.

This function enables averaging and selects the number of conversions to average. The mask parameter should be set using the Adc_Ip_AvgSelectType enum elements that have the pattern ADC_IP_AVG_... e.g. ADC_IP_A↩VG_4_CONV.

Parameters

in	*Instance*	- ADC instance number
in	*AvgEn*	- enable or disable averaging
in	*AvgSel*	- selects number of conversions to average

Returns

void

6.2.5.4 Adc_Ip_SetSampleTime()

```
void Adc_Ip_SetSampleTime (
             const uint32 Instance,
             const uint8 SampleTime )
```

Configure sample time.

This function sets the sample time for selected ADC instance.

Parameters

in	*Instance*	- ADC instance number
in	*SampleTime*	- sample time

Returns

void

6.2.5.5 Adc_Ip_EnableDma()

```
void Adc_Ip_EnableDma (
             const uint32 Instance )
```

Enable DMA.

This function enables DMA.

Parameters

in	*Instance*	- ADC instance number

Returns

void

6.2.5.6 Adc_Ip_DisableDma()

```
void Adc_Ip_DisableDma (
            const uint32 Instance )
```

Disable DMA.

This function disables DMA.

Parameters

in	*Instance*	- ADC instance number

Returns

void

6.2.5.7 Adc_Ip_SetTriggerMode()

```
void Adc_Ip_SetTriggerMode (
            const uint32 Instance,
            const Adc_Ip_TrigType TriggerMode )
```

Switch between hardware and software trigger.

This function enables either hardware or software trigger.

Parameters

in	*Instance*	- ADC instance number
in	*TriggerMode*	- selected trigger mode(sw/hw)

Returns

void

6.2.5.8 Adc_Ip_SetContinuousMode()

```
void Adc_Ip_SetContinuousMode (
             const uint32 Instance,
             const boolean ContinuousModeEnable )
```

Switch between continuous and one shot conversion mode.

This function switches between ADC continuous conversion mode and one shot mode.

Parameters

in	*Instance*	- ADC instance number
in	*ContinuousModeEnable*	- mode to set: continuous(TRUE) or one shot(FALSE)

Returns

void

6.2.5.9 Adc_Ip_SetResolution()

```
void Adc_Ip_SetResolution (
             const uint32 Instance,
             const Adc_Ip_ResolutionType Resolution )
```

Set ADC module resolution.

This function sets ADC module resolution.

Parameters

in	*Instance*	- ADC instance number
in	*Resolution*	- resolution value

Returns

void

6.2.5.10 Adc_Ip_SetClockMode()

```
void Adc_Ip_SetClockMode (
             const uint32 Instance,
             const Adc_Ip_ClockConfigType *const Config )
```

Set the ADC clock values.

This function initializes the ADC clock configuration.

Parameters

in	*Instance*	- ADC instance number
in	*Config*	- the clock configuration

Returns

void

6.2.5.11 Adc_Ip_ConfigChannel()

```
void Adc_Ip_ConfigChannel (
            const uint32 Instance,
            const Adc_Ip_ChanConfigType *const ChanConfig )
```

Configure the selected control channel with the given configuration structure.

When Software Trigger mode is enabled, configuring control channel index 0, implicitly triggers a new conversion on the selected ADC input channel. Therefore, Adc_Ip_ConfigChannel can be used for sw-triggering conversions.

Configuring any control channel while it is actively controlling a conversion (sw or hw triggered) will implicitly abort the on-going conversion.

Parameters

in	*Instance*	- ADC instance number
in	*ChanConfig*	- configuration structure

Returns

void

6.2.5.12 Adc_Ip_SetDisabledChannel()

```
Adc_Ip_StatusType Adc_Ip_SetDisabledChannel (
            const uint32 Instance,
            const uint8 ControlChanIdx,
            const boolean WithTimeout )
```

Disable selected channel.

This function sets the input channel of the selected control channel to ADC_IP_INPUTCHAN_DISABLED. If WithTimeout is TRUE then the function will also wait for the register to be updated. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel.

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index
in	*WithTimeout*	- enables loop that checks if the register was updated

Returns

Adc_Ip_StatusType

6.2.5.13 Adc_Ip_StartConversion()

```
void Adc_Ip_StartConversion (
            const uint32 Instance,
            Adc_Ip_InputChannelType InputChannel,
            const boolean InterruptEnable )
```

Start a software triggered conversion.

This function starts a software conversion on the selected input channel by writing the values given to the SC1A register. Note: hardware configuration on the control channel with index 0 will be overwritten. Note: This will not work if hardware triggered mode is selected.

Parameters

in	*Instance*	- ADC instance number
in	*InputChannel*	- channel index
in	*InterruptEnable*	- enables end of conversion interrupt. No effect if ADC_IP_AIEN_INTERRUPT_ENABLE = STD_OFF

Returns

void

6.2.5.14 Adc_Ip_GetConvActiveFlag()

```
boolean Adc_Ip_GetConvActiveFlag (
            const uint32 Instance )
```

Read and return conversion active flag status.

Parameters

in	*Instance*	- ADC instance number

Returns

conversion active flag status

6.2.5.15 Adc_Ip_GetChanInterrupt()

```
boolean Adc_Ip_GetChanInterrupt (
            const uint32 Instance,
            const uint8 ControlChanIdx )
```

Check if selected channel has interrupt set.

This function checks and returns if the selected control channel has the interrupt flag set. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel.

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index

Returns

TRUE if channel has interrupt set or FALSE otherwise

6.2.5.16 Adc_Ip_GetConvCompleteFlag()

```
boolean Adc_Ip_GetConvCompleteFlag (
            const uint32 Instance,
            const uint8 ControlChanIdx )
```

Get the value of conversion complete flag of a channel.

This function returns the value of the conversion complete(COCO) flag of a given channel. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel.

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index

Returns

value of conversion complete flag

6.2.5.17 Adc_Ip_GetConvData()

```
uint16 Adc_Ip_GetConvData (
            const uint32 Instance,
            const uint8 ControlChanIdx )
```

Get the last result for the selected control channel.

This function retrieves the last conversion result for the selected control channel. This function does no validity check on the result. In order to check if the result is valid, the user must call Adc_Ip_GetConvCompleteFlag function before this one. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel.

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index

Returns

conversion result

6.2.5.18 Adc_Ip_DoCalibration()

```
Adc_Ip_StatusType Adc_Ip_DoCalibration (
            const uint32 Instance )
```

Perform calibration of the ADC module.

This function performs a calibration of the ADC module. The input clock frequency for calibration must be less than or equal to half of the maximum specified frequency (50Mhz) and greater than minimum specified frequency (20Mhz). Please refer to Datasheet for more details

Parameters

in	*Instance*	- ADC instance number

Returns

the calibration result

- ADC_IP_STATUS_SUCCESS: calibration successful
- ADC_IP_STATUS_TIMEOUT: calibration step timed out

6.2.5.19 Adc_Ip_ClearLatchedTriggers()

```
Adc_Ip_StatusType Adc_Ip_ClearLatchedTriggers (
            const uint32 Instance )
```

Clear latched triggers under processing.

This function clears all trigger latched flags of the ADC instance. This function must be called after the hardware trigger source for the ADC has been deactivated.

Parameters

in	*Instance*	- ADC instance number

Returns

clearing status

- ADC_IP_STATUS_SUCCESS: operation successful
- ADC_IP_STATUS_TIMEOUT: operation timed out

6.2.5.20 Adc_Ip_EnableChannelNotification()

```
void Adc_Ip_EnableChannelNotification (
            const uint32 Instance,
            const uint8 ControlChanIdx )
```

Enable channel notification.

This function enables the notification for the selected channel. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel. Note: It's required to read result data in user notification in order to clear the COCO flags and avoid ISR getting invoked repeatedly

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index

Returns

void

6.2.5.21 Adc_Ip_DisableChannelNotification()

```
void Adc_Ip_DisableChannelNotification (
            const uint32 Instance,
            const uint8 ControlChanIdx )
```

Disable channel notification.

This function disables the notification for the selected channel. Note: the control channel index is the numeric index of SC1x (e.g. SC1A has index 0), not the input channel.

Parameters

in	*Instance*	- ADC instance number
in	*ControlChanIdx*	- control channel index

Returns

void

6.2.5.22 Adc_Ip_ClearTrigErrReg()

```
void Adc_Ip_ClearTrigErrReg (
            const uint32 Instance )
```

Clear all trigger error flags.

This function clears all trigger error flags of the ADC instance.

Parameters

in	*Instance*	- ADC instance number

Returns

void

6.2.5.23 Adc_Ip_GetTrigErrReg()

```
uint32 Adc_Ip_GetTrigErrReg (
            const uint32 Instance )
```

Get all trigger error flags.

This function returns all trigger error flags of the ADC instance.

Parameters

in	*Instance*	- ADC instance number

Returns

trigger error flags bit-mask

6.2.5.24 Adc_Ip_GetDataAddress()

```
uint32 Adc_Ip_GetDataAddress (
            const uint32 Instance,
            const uint8 Index )
```

Return the address of the specified data register.

This function returns the address of the specified data register

Parameters

in	*Instance*	- ADC instance number
in	*Index*	- ADC channel of the Hw unit

Returns

status:

- value of the address of the data for the specified channel

6.2.5.25 Adc_Ip_GetChanData()

```
Adc_Ip_StatusType Adc_Ip_GetChanData (
            const uint32 Instance,
            const Adc_Ip_InputChannelType Channel,
            uint16 *const Result )
```

Get the last result for the selected control channel.

This function retrieves the last conversion result for the selected input channel, by looking which control channel was configured with it. If multiple control channels are configured simultaneously with the same requested input channel, the result of the first control channel found will be returned. If no control channel is configured with the given input channel then ADC_IP_STATUS_ERROR will be returned. This function does no validity check on the result. In order to check if the result is valid, the user must call Adc_Ip_GetConvCompleteFlag function before this one.

Parameters

in	*Instance*	- ADC instance number
in	*Channel*	- input channel
out	*Result*	- pointer to the buffer where the result will be written

Returns

status

6.2.5.26 Adc_Ip_SetSupplyMonitoringEnable_TrustedCall()

```
void Adc_Ip_SetSupplyMonitoringEnable_TrustedCall (
            const boolean SupplyEnable )
```

This function enable supply monitoring for the internal channels on SIM registers.

This function enable supply monitoring for the internal channels on SIM registers

Parameters

in	*SupplyEnable*	Enable (TRUE) or Disable (FALSE) supply monitoring

6.2.5.27 Adc_Ip_ConfigSupplyMonitoringChannel_TrustedCall()

```
void Adc_Ip_ConfigSupplyMonitoringChannel_TrustedCall (
            const uint32 SupplyChannel )
```

This function configures the internal channels on on SIM registers.

This function configures the internal channels on on SIM registers

Parameters

in	*SupplyChannel*	Selected supply channel

6.2.5.28 Adc_Ip_ResetSupplyMonitoringChannel_TrustedCall()

```
void Adc_Ip_ResetSupplyMonitoringChannel_TrustedCall (
             void  )
```

This function resets the muxing for ADC channel on SIM register to reset value.

This function resets the muxing for ADC channel on SIM register to reset value

Parameters

in	*none*	

6.3 Pdb Adc IPL

6.3.1 Detailed Description Pdb HW module.

Pdb IP layer hardware module.

Data Structures

- struct Pdb_Adc_Ip_PretriggersConfigType

  Defines the type of structure for configuring an ADC pretrigger. Implements : Pdb_Adc_Ip_PretriggerConfig↩ Type_Class. More...
- struct Pdb_Adc_Ip_ChanConfigType

  Defines the type of structure for configuring a single PDB channel. Implements : Pdb_Adc_Ip_ChanConfigType↩ _Class. More...
- struct Pdb_Adc_Ip_ConfigType

  Defines the type of structure for basic timer in PDB. More...
- struct Pdb_Adc_Ip_StateStructType

  Structure used to store runtime info. More...

Types Reference

- typedef void Pdb_Adc_Ip_SeqErrNotificationType(uint8 ChanIdx, uint16 SeqErrMask)

  Defines the sequence error notification header.

Enum Reference

- enum Pdb_Adc_Ip_LoadValueModeType

  Defines the type of value load mode for the PDB module.
- enum Pdb_Adc_Ip_ClkPrescalerDivType

  Defines the type of prescaler divider for the PDB counter clock. Implements : Pdb_Adc_Ip_ClkPrescalerDivType↩ _Class.
- enum Pdb_Adc_Ip_ClkPrescalerMultFactType

  Defines the type of the multiplication source mode for PDB.
- enum Pdb_Adc_Ip_TriggerSrcType

  Defines the type of trigger source mode for the PDB.

Function Reference

- void Pdb_Adc_Ip_Init (const uint32 Instance, const Pdb_Adc_Ip_ConfigType *const Config)

  Initialize PDB module.
- void Pdb_Adc_Ip_DeInit (const uint32 Instance)

  Deinitialize PDB module.
- void Pdb_Adc_Ip_Enable (const uint32 Instance)

  Enable the PDB module.
- void Pdb_Adc_Ip_Disable (const uint32 Instance)

  Disable the PDB module.
- void Pdb_Adc_Ip_SetTriggerInput (const uint32 Instance, const Pdb_Adc_Ip_TriggerSrcType Trigger↩ Source)

  Set PDB trigger source.
- void Pdb_Adc_Ip_SetContinuousMode (const uint32 Instance, const boolean State)

  Set PDB mode.
- void Pdb_Adc_Ip_SwTrigger (const uint32 Instance)

  Trigger the PDB with a software trigger.
- uint32 Pdb_Adc_Ip_GetTimerValue (const uint32 Instance)

  Get the current value of the PDB counter.
- void Pdb_Adc_Ip_LoadRegValues (const uint32 Instance)

  Load buffered register values.
- void Pdb_Adc_Ip_SetModulus (const uint32 Instance, const uint16 ModVal)

  Set the period of the counter.
- void Pdb_Adc_Ip_ConfigAdcPretriggers (const uint32 Instance, const uint8 ChanIdx, const Pdb_Adc_Ip_PretriggersConf *const Config)

  Configure all pretriggers on the selected channel.
- uint32 Pdb_Adc_Ip_GetAdcPretriggerFlags (const uint32 Instance, const uint8 ChanIdx)

  Get ADC pretrigger channel flags from the PDB module.
- void Pdb_Adc_Ip_ClearAdcPretriggerFlags (const uint32 Instance, const uint8 ChanIdx, const uint16 PretriggMask)

  Clear ADC pretrigger channel flags from the PDB module.
- void Pdb_Adc_Ip_SetAdcPretriggerBackToBack (const uint32 Instance, const uint8 ChanIdx, const uint8 PretriggIdx, const boolean Value)

  Set back to back mode for the selected pretrigger.
- void Pdb_Adc_Ip_SetAdcPretriggerEnable (const uint32 Instance, const uint8 ChanIdx, const uint8 PretriggIdx, const boolean Value)

  Enable or disable the selected pretrigger.
- void Pdb_Adc_Ip_SetAdcPretriggerDelayEnable (const uint32 Instance, const uint8 ChanIdx, const uint8 PretriggIdx, const boolean Value)

  Set the delay enable for the selected pretrigger.
- void Pdb_Adc_Ip_SetAdcPretriggerDelayValue (const uint32 Instance, const uint8 ChanIdx, const uint8 PretriggIdx, const uint16 DelayValue)

  Set the pretrigger delay value.
- void Pdb_Adc_Ip_DisableAndClearPdb (const uint32 Instance)

  Disable and clear PDB module.

6.3.2 Data Structure Documentation

6.3.2.1 struct Pdb_Adc_Ip_PretriggersConfigType

Defines the type of structure for configuring an ADC pretrigger. Implements : Pdb_Adc_Ip_PretriggerConfig↩ Type_Class.

Definition at line 168 of file Pdb_Adc_Ip_Types.h.

Data Fields

Type	Name	Description
uint8	EnableMask	Mask of enabled pretriggers.
uint8	EnableDelayMask	Mask of pretriggers with delays enabled.
uint8	BackToBackEnableMask	Mask of pretriggers with back to back mode enabled. If enabled, the pretrigger will be activated automatically when the ADC COCO flag corresponding to the previous pretrigger in the chain, is set. The previous pretrigger for pretriggers with index 0, depend on features InstanceBackToBackEnable and InterChannelBackToBackEnable.

6.3.2.2 struct Pdb_Adc_Ip_ChanConfigType

Defines the type of structure for configuring a single PDB channel. Implements : Pdb_Adc_Ip_ChanConfigType↩ _Class.

Definition at line 181 of file Pdb_Adc_Ip_Types.h.

Data Fields

Type	Name	Description
uint8	ChnIdx	PDB channel index.
Pdb_Adc_Ip_PretriggersConfigType	PretriggersConfig	Pretriggers configuration.
uint16	PretriggerDelays[PDB_DLY_COUNT]	Pretriggers delay array, positional dependent(delay for pretrigger 0 must be at index 0)

6.3.2.3 struct Pdb_Adc_Ip_ConfigType

Defines the type of structure for basic timer in PDB.

Implements : Pdb_Adc_Ip_ConfigType_Class

Definition at line 193 of file Pdb_Adc_Ip_Types.h.

Data Fields

Type	Name	Description
Pdb_Adc_Ip_LoadValueModeType	LoadValueMode	Select the load mode.
Pdb_Adc_Ip_ClkPrescalerDivType	PrescalerDiv	Select the prescaler divider.
Pdb_Adc_Ip_ClkPrescalerMultFactType	ClkPreMultFactor	Select multiplication factor for prescaler.
Pdb_Adc_Ip_TriggerSrcType	TriggerSource	Select the trigger input source.
boolean	ContinuousModeEnable	Enable the continuous mode.
boolean	DmaEnable	Enable the dma for timer.
uint16	ModValue	Modulus register value.
uint8	NumChans	Number of PDB Channels
const Pdb_Adc_Ip_ChanConfigType *	ChanConfigs	PDB Channel configuration
Pdb_Adc_Ip_SeqErrNotificationType *	SeqErrNotification	Sequence error notification.

6.3.2.4 struct Pdb_Adc_Ip_StateStructType

Structure used to store runtime info.

This structure is used to store PDB runtime info

Implements : Pdb_Adc_Ip_StateStructType_Class

Definition at line 227 of file Pdb_Adc_Ip_Types.h.

Data Fields

Type	Name	Description
boolean	Init	Check if the driver was initialized.
Pdb_Adc_Ip_SeqErrNotificationType *	SeqErrNotification	Sequence error notification

6.3.3 Types Reference

6.3.3.1 Pdb_Adc_Ip_SeqErrNotificationType

```
typedef void Pdb_Adc_Ip_SeqErrNotificationType(uint8 ChanIdx, uint16 SeqErrMask)
```

Defines the sequence error notification header.

This header is used for sequence error notification callbacks

Implements : Pdb_Adc_Ip_SeqErrNotificationType_Class

Definition at line 162 of file Pdb_Adc_Ip_Types.h.

6.3.4 Enum Reference

6.3.4.1 Pdb_Adc_Ip_LoadValueModeType

enum Pdb_Adc_Ip_LoadValueModeType

Defines the type of value load mode for the PDB module.

Some timing related registers, such as the MOD, IDLY, CHnDLYm, INTx and POyDLY, buffer the setting values. Only the load operation is triggered. The setting value is loaded from a buffer and takes effect. There are four loading modes to fit different applications. Implements : Pdb_Adc_Ip_LoadValueModeType_Class

Enumerator

PDB_ADC_IP_LOAD_VAL_IMMEDIATELY	Loaded immediately after load operation.
PDB_ADC_IP_LOAD_VAL_AT_MODULO_C↩ OUNTER	Loaded when counter hits the modulo after load operation.
PDB_ADC_IP_LOAD_VAL_AT_NEXT_TRIG↩ GER	Loaded when detecting an input trigger after load operation.
PDB_ADC_IP_LOAD_VAL_AT_MODULO_C↩ OUNTER_OR_NEXT_TRIGGER	Loaded when counter hits the modulo or detecting an input trigger after load operation.

Definition at line 104 of file Pdb_Adc_Ip_Types.h.

6.3.4.2 Pdb_Adc_Ip_ClkPrescalerDivType

enum Pdb_Adc_Ip_ClkPrescalerDivType

Defines the type of prescaler divider for the PDB counter clock. Implements : Pdb_Adc_Ip_ClkPrescalerDiv↩ Type_Class.

Enumerator

PDB_ADC_IP_CLK_PREDIV_BY_1	Counting divided by 1 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_2	Counting divided by 2 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_4	Counting divided by 4 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_8	Counting divided by 8 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_16	Counting divided by 16 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_32	Counting divided by 32 x prescaler multiplication factor (selected by MULT).

Enumerator

PDB_ADC_IP_CLK_PREDIV_BY_64	Counting divided by 64 x prescaler multiplication factor (selected by MULT).
PDB_ADC_IP_CLK_PREDIV_BY_128	Counting divided by 128 x prescaler multiplication factor (selected by MULT).

Definition at line 116 of file Pdb_Adc_Ip_Types.h.

6.3.4.3 Pdb_Adc_Ip_ClkPrescalerMultFactType

enum Pdb_Adc_Ip_ClkPrescalerMultFactType

Defines the type of the multiplication source mode for PDB.

Selects the multiplication factor of the prescaler divider for the PDB counter clock. Implements : Pdb_Adc_Ip_↩ ClkPrescalerMultFactType_Class

Enumerator

PDB_ADC_IP_CLK_PREMULT_FACT_AS_1	Multiplication factor is 1.
PDB_ADC_IP_CLK_PREMULT_FACT_AS_10	Multiplication factor is 10.
PDB_ADC_IP_CLK_PREMULT_FACT_AS_20	Multiplication factor is 20.
PDB_ADC_IP_CLK_PREMULT_FACT_AS_40	Multiplication factor is 40.

Definition at line 134 of file Pdb_Adc_Ip_Types.h.

6.3.4.4 Pdb_Adc_Ip_TriggerSrcType

enum Pdb_Adc_Ip_TriggerSrcType

Defines the type of trigger source mode for the PDB.

Selects the trigger input source for the PDB. The trigger input source can be internal or the software trigger. Implements : Pdb_Adc_Ip_TriggerSrcType_Class

Enumerator

PDB_ADC_IP_TRIGGER_IN0	Source trigger comes from TRGMUX.
PDB_ADC_IP_SOFTWARE_TRIGGER	Select software trigger.

Definition at line 149 of file Pdb_Adc_Ip_Types.h.

6.3.5 Function Reference

6.3.5.1 Pdb_Adc_Ip_Init()

```
void Pdb_Adc_Ip_Init (
            const uint32 Instance,
            const Pdb_Adc_Ip_ConfigType *const Config )
```

Initialize PDB module.

This function initializes the PDB counter, input triggers and general pretrigger settings. It resets PDB registers and enables the PDB clock. Therefore, it should be called before any other operation. After it is initialized, the PDB can act as a triggered timer, which enables other features in PDB module.

Parameters

in	*Instance*	- PDB instance number
in	*Config*	- configuration struct pointer

Returns

void

6.3.5.2 Pdb_Adc_Ip_DeInit()

```
void Pdb_Adc_Ip_DeInit (
            const uint32 Instance )
```

Deinitialize PDB module.

This function resets the PDB internal registers to default values.

When the PDB module is not used. Calling this function would shut down the PDB module and reduce the power consumption.

Note: instance back to back configuration is common between PDB instances 0 and 1 (configures the same register even if configured for either PDB instance) This function disables it, so affects all other instances.

Parameters

in	*Instance*	- PDB instance number

Returns

void

6.3.5.3 Pdb_Adc_Ip_Enable()

```
void Pdb_Adc_Ip_Enable (
            const uint32 Instance )
```

Enable the PDB module.

This function enables the PDB module, counter is on.

Parameters

in	*Instance*	- PDB instance number

Returns

void

6.3.5.4 Pdb_Adc_Ip_Disable()

```
void Pdb_Adc_Ip_Disable (
            const uint32 Instance )
```

Disable the PDB module.

This function disables the PDB module, counter is off.

Parameters

in	*Instance*	- PDB instance number

6.3.5.5 Pdb_Adc_Ip_SetTriggerInput()

```
void Pdb_Adc_Ip_SetTriggerInput (
            const uint32 Instance,
            const Pdb_Adc_Ip_TriggerSrcType TriggerSource )
```

Set PDB trigger source.

This function sets the PDB trigger source.

Parameters

in	*Instance*	- PDB instance number
in	*TriggerSource*	- trigger source

Returns

void

6.3.5.6 Pdb_Adc_Ip_SetContinuousMode()

```
void Pdb_Adc_Ip_SetContinuousMode (
             const uint32 Instance,
             const boolean State )
```

Set PDB mode.

This function sets the PDB mode to continuous or one shot.

Parameters

in	*Instance*	- PDB instance number
in	*State*	- mode to set: continuous(true) or one shot(FALSE)

Returns

void

6.3.5.7 Pdb_Adc_Ip_SwTrigger()

```
void Pdb_Adc_Ip_SwTrigger (
             const uint32 Instance )
```

Trigger the PDB with a software trigger.

This function triggers the PDB with a software trigger. When the PDB is set to use the software trigger as input, calling this function triggers the PDB.

Parameters

in	*Instance*	- PDB instance number

Returns

void

6.3.5.8 Pdb_Adc_Ip_GetTimerValue()

```
uint32 Pdb_Adc_Ip_GetTimerValue (
             const uint32 Instance )
```

Get the current value of the PDB counter.

This function gets the current counter value.

Parameters

in	*Instance*	- PDB instance number

Returns

Current PDB counter value.

6.3.5.9 Pdb_Adc_Ip_LoadRegValues()

```
void Pdb_Adc_Ip_LoadRegValues (
             const uint32 Instance )
```

Load buffered register values.

This function sets the LDOK bit. Writing one to this bit updates the internal registers MOD, IDLY, CHnDLYm and POyDLY with the values written to their buffers. The MOD, IDLY, CHnDLYm and POyDLY take effect according to the load mode settings.

After one is written to the LDOK bit, the values in the buffers of above mentioned registers are not effective and cannot be written until the values in the buffers are loaded into their internal registers. The moment when this happens depends on the value of the LDMOD register. Only when this register is in it's default state(0), the load operation will happen immediately. Please check the reference manual for more information. The LDOK can be written only when the the PDB is enabled or as alone with it. It is automatically cleared either when the values in the buffers are loaded into the internal registers or when the PDB is disabled.

Parameters

in	*Instance*	- PDB instance number

Returns

void

6.3.5.10 Pdb_Adc_Ip_SetModulus()

```
void Pdb_Adc_Ip_SetModulus (
            const uint32 Instance,
            const uint16 ModVal )
```

Set the period of the counter.

This function sets the PDB Modulus value. Note: This function writes in an internal buffer. Depending on the value of the LDMOD register, it might be necessary to call Pdb_Adc_Ip_LoadRegValues in order to update the value of the register. The value of the register can be changed only when the PDB module is enabled.

Parameters

in	*Instance*	- PDB instance number
in	*ModVal*	- modulus value

Returns

void

6.3.5.11 Pdb_Adc_Ip_ConfigAdcPretriggers()

```
void Pdb_Adc_Ip_ConfigAdcPretriggers (
            const uint32 Instance,
            const uint8 ChanIdx,
            const Pdb_Adc_Ip_PretriggersConfigType *const Config )
```

Configure all pretriggers on the selected channel.

This function configures the back to back modes, delay enable and output enable settings for all pretriggers on the selected channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*Config*	- pretriggers config

Returns

void

6.3.5.12 Pdb_Adc_Ip_GetAdcPretriggerFlags()

```
uint32 Pdb_Adc_Ip_GetAdcPretriggerFlags (
            const uint32 Instance,
            const uint8 ChanIdx )
```

Get ADC pretrigger channel flags from the PDB module.

This function gets all ADC pretrigger flags from the selected channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel

Returns

bitmask of channel flags selected by pretriggMask

6.3.5.13 Pdb_Adc_Ip_ClearAdcPretriggerFlags()

```
void Pdb_Adc_Ip_ClearAdcPretriggerFlags (
            const uint32 Instance,
            const uint8 ChanIdx,
            const uint16 PretriggMask )
```

Clear ADC pretrigger channel flags from the PDB module.

This function clears the ADC pretrigger channel flags selected by pretriggMask from channel channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*PretriggMask*	- ADC pretriggers mask

6.3.5.14 Pdb_Adc_Ip_SetAdcPretriggerBackToBack()

```
void Pdb_Adc_Ip_SetAdcPretriggerBackToBack (
             const uint32 Instance,
             const uint8 ChanIdx,
             const uint8 PretriggIdx,
             const boolean Value )
```

Set back to back mode for the selected pretrigger.

This function sets back to back mode for the selected pretrigger on the given channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*PretriggIdx*	- ADC pretrigger index
in	*Value*	- enable(true) or disable(FALSE)

6.3.5.15 Pdb_Adc_Ip_SetAdcPretriggerEnable()

```
void Pdb_Adc_Ip_SetAdcPretriggerEnable (
             const uint32 Instance,
             const uint8 ChanIdx,
             const uint8 PretriggIdx,
             const boolean Value )
```

Enable or disable the selected pretrigger.

This function enables or disables the selected pretrigger on the given channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*PretriggIdx*	- ADC pretrigger mask
in	*Value*	- enable(true) or disable(FALSE)

6.3.5.16 Pdb_Adc_Ip_SetAdcPretriggerDelayEnable()

```
void Pdb_Adc_Ip_SetAdcPretriggerDelayEnable (
             const uint32 Instance,
             const uint8 ChanIdx,
             const uint8 PretriggIdx,
             const boolean Value )
```

Set the delay enable for the selected pretrigger.

This function sets the delay enable value for the selected pretrigger on the given channel.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*PretriggIdx*	- ADC pretrigger index
in	*Value*	- enable(true) or disable(FALSE)

6.3.5.17 Pdb_Adc_Ip_SetAdcPretriggerDelayValue()

```
void Pdb_Adc_Ip_SetAdcPretriggerDelayValue (
             const uint32 Instance,
             const uint8 ChanIdx,
             const uint8 PretriggIdx,
             const uint16 DelayValue )
```

Set the pretrigger delay value.

This function sets the pretrigger delay value Note: This function writes in an internal buffer. Depending on the value of the LDMOD register, it might be necessary to call Pdb_Adc_Ip_LoadRegValues in order to update the value of the register. The value of the register can be changed only when the PDB module is enabled.

Parameters

in	*Instance*	- PDB instance number
in	*ChanIdx*	- PDB channel
in	*PretriggIdx*	- ADC pretrigger index
in	*DelayValue*	- pretrigger delay value

6.3.5.18 Pdb_Adc_Ip_DisableAndClearPdb()

```
void Pdb_Adc_Ip_DisableAndClearPdb (
             const uint32 Instance )
```

Disable and clear PDB module.

This function disables PDB module and clears all channels configuration and status registers. Note: This function does not deinitialize the module.

Parameters

in	*Instance*	- PDB instance number

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