
User Manual

for S32K14X ADC Driver

Document Number: UM2ADCASR4.2 Rev0002R1.0.1
Rev. 1.0





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Chapter 1

Revision History

Table 1-1. Revision History

Revision	Date	Author	Description
1.0	13/07/2018	NXP MCAL Team	Updated version for ASR 4.2.2S32K14X1.0.1 Release



Chapter 2

Introduction

This User Manual describes NXP Semiconductors AUTOSAR Analog to Digital Converter (Adc) for S32K14X .

AUTOSAR Adc driver configuration parameters and deviations from the specification are described in Adc 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 .

Table 2-1. S32K14X Derivatives

NXP Semiconductors	s32k148_lqfp144, s32k148_lqfp176, s32k148_mapbga100, s32k146_lqfp144, s32k146_lqfp100, s32k146_lqfp64, s32k146_mapbga100, s32k144_lqfp100, s32k144_lqfp64, s32k144_mapbga100, s32k142_lqfp100, s32k142_lqfp64, s32k118_lqfp48, s32k118_lqfp64
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All of the above microcontroller devices are collectively named as S32K14X .

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 type: Bold is used for important terms, notes and warnings.

Italic font: Italic typeface is 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.

2.4 Acronyms and Definitions

Table 2-2. Acronyms and Definitions

Term	Definition
ADC	Analog to Digital Converter
API	Application Programming Interface
ASM	Assembler
AUTOSAR	Automotive Open System Architecture
BSMI	Basic Software Make file Interface
CAN	Controller Area Network
C/CPP	C and C++ Source Code
CS	Chip Select
CTU	Cross Trigger Unit
DEM	Diagnostic Event Manager
DET	Development Error Tracer

Table continues on the next page...

Table 2-2. Acronyms and Definitions (continued)

Term	Definition
DMA	Direct Memory Access
ECU	Electronic Control Unit
FIFO	First In First Out
LSB	Least Significant Bit
MCU	Micro Controller Unit
MIDE	Multi Integrated Development Environment
MSB	Most Significant Bit
N/A	Not Applicable
RAM	Random Access Memory
SIU	Systems Integration Unit
SWS	Software Specification
VLE	Variable Length Encoding
XML	Extensible Markup Language

2.5 Reference List

Table 2-3. Reference List

#	Title	Version
1	Specification of Adc Driver	AUTOSAR Release 4.2.2
2	S32K14X Reference Manual	Reference Manual, Rev. 7, 04/2018
3	S32K142 Mask Set Errata for Mask 0N33V (0N33V)	30/11/2017
4	S32K144 Mask Set Errata for Mask 0N57U (0N57U)	30/11/2017
5	S32K146 Mask Set Errata for Mask 0N73V (0N73V)	30/11/2017
6	S32K148 Mask Set Errata for Mask 0N20V (0N20V)	30/11/2017
7	S32K118 Mask Set Errata for Mask 0N97V (0N97V)	26/02/2018

Chapter 3 Driver

3.1 Requirements

Requirements for this driver are detailed in the AUTOSAR 4.2 Rev0002Adc Driver Software Specification document (See Table [Reference List](#)).

3.2 Driver Design Summary

The ADC Driver initializes and controls the internal Analogue 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 analogue 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

- **S32K118 device families at 48 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K118 device families at 64 pins:**

- **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K142 device families at 64 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_10,AN_11,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K142 device families at 100 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K144 device families at 64 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_10,AN_11,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K144 device families at 100 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K146 device families at 64 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_10,AN_11,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K146 device families at 100 pins:**

- **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **Adc Physical Channels for ADC HW Unit 1:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K146 device families at 144 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,AN_16,AN_17,AN_18,AN_19,AN_20,AN_21,AN_22,AN_23,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,AN_16,AN_17,AN_18,AN_19,AN_20,AN_21,AN_22,AN_23,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K148 device at 144 pins and 176 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,AN_16,AN_17,AN_18,AN_19,AN_20,AN_21,AN_22,AN_23,AN_24,AN_25,AN_26,AN_27,AN_28,AN_29,AN_30,AN_31,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,AN_16,AN_17,AN_18,AN_19,AN_20,AN_21,AN_22,AN_23,AN_24,AN_25,AN_26,AN_27,AN_28,AN_29,AN_30,AN_31,INT_AN_0,BAND_GAP,VREFH,VREFL
- **S32K148 device families at 100 pins:**
 - **Adc Physical Channels for ADC HW Unit 0:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL
 - **Adc Physical Channels for ADC HW Unit 1:**
AN_0,AN_1,AN_2,AN_3,AN_4,AN_5,AN_6,AN_7,AN_8,AN_9,AN_10,AN_11,AN_12,AN_13,AN_14,AN_15,INT_AN_0,BAND_GAP,VREFH,VREFL

The following picture in Reference Manual - chapter **42.4.2 ADC Status and Control Register 1 (SC1A - aSC1P)** provides ADC pin channel mapping details.

5-0 ADCH	<p>Input channel select</p> <p>Selects one of the input channels.</p> <p>NOTE: Some of the input channel options in the bitfield-setting descriptions might not be available for your chip. For the actual ADC channel assignments for your device, see the chip-specific information.</p> <p>The successive approximation converter subsystem is turned off when the channel bits are all set (i.e. ADCH set to all 1s). This feature allows explicit disabling of the ADC and isolation of the input channel from all sources. Terminating continuous conversions this way prevents an additional single conversion from being performed. It is not necessary to set ADCH to all 1s to place the ADC in a low-power state when continuous conversions are not enabled because the module automatically enters a low-power state when a conversion completes.</p> <p>000000b - External channel 0 is selected as input. 000001b - External channel 1 is selected as input. 000010b - External channel 2 is selected as input. 000011b - External channel 3 is selected as input. 000100b - External channel 4 is selected as input. 000101b - External channel 5 is selected as input. 000110b - External channel 6 is selected as input.</p>
-------------	---

000111b	- External channel 7 is selected as input.
001000b	- External channel 8 is selected as input.
001001b	- External channel 9 is selected as input.
001010b	- External channel 10 is selected as input.
001011b	- External channel 11 is selected as input.
001100b	- External channel 12 is selected as input.
001101b	- External channel 13 is selected as input.
001110b	- External channel 14 is selected as input.
001111b	- External channel 15 is selected as input.
010000b	- Reserved
010001b	- Reserved
010010b	- Reserved
010011b	- Reserved
010100b	- Reserved
010101b	- Internal channel 0 is selected as input.
010110b	- Internal channel 1 is selected as input.
010111b	- Internal channel 2 is selected as input.
011000b	- Reserved
011001b	- Reserved
011010b	- Reserved
011011b	- Band Gap
011100b	- Internal channel 3 is selected as input.
011101b	- V_{REFSH} is selected as input. Voltage reference selected is determined by SC2[REFSEL].
011110b	- V_{REFSL} is selected as input. Voltage reference selected is determined by SC2[REFSEL].
011111b	- Reserved
100000b	- External channel 16 is selected as input.
100001b	- External channel 17 is selected as input.
100010b	- External channel 18 is selected as input.
100011b	- External channel 19 is selected as input.
100100b	- External channel 20 is selected as input.
100101b	- External channel 21 is selected as input.
100110b	- External channel 22 is selected as input.
100111b	- External channel 23 is selected as input.
101000b	- External channel 24 is selected as input.
101001b	- External channel 25 is selected as input.
101010b	- External channel 26 is selected as input.
101011b	- External channel 27 is selected as input.
101100b	- External channel 28 is selected as input.
101101b	- External channel 29 is selected as input.
101110b	- External channel 30 is selected as input.
101111b	- External channel 31 is selected as input.
110000b	- Reserved
110001b	- Reserved
110010b	- Reserved
110011b	- Reserved
110100b	- Reserved
110101b	- Reserved
110110b	- Reserved
110111b	- Reserved
111000b	- Reserved
111001b	- Reserved
111010b	- Reserved
111011b	- Reserved
111100b	- Reserved
111101b	- Reserved
111110b	- Reserved
111111b	- Module is disabled

Figure 3-1. ADC_SC1n.ADCH field descriptions

- **Direct hardware triggering**
 - ADC supports normal hardware triggering directly from PDB. Hardware trigger source must be configured in Mcl.

3.4 Deviation 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, or out of scope for the Adc Driver. Table [Table 3-1](#) provides Status column description.

Table 3-1. Deviations Status Column Description

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

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

Table 3-2. ADC Deviations Table

Requirement	Status	Description	Notes
SWS_Adc_0052 2	N/I	Name: Adc_PriorityImplementationType Type: Enumeration Range: ADC_PRIORITY_NONE priority mechanism is not available ADC_PRIORITY_HW Hardware priority mechanism is available only ADC_PRIORITY_HW_SW Hardware and software priority mechanism is available Description: Type for configuring the prioritization mechanism.	In AutoSAR concept an enumeration can be implemented as a #define (see SWS_Std_00006) or by using enum keyword in C (followed up by ENGR00367771).

3.5 ADC Driver limitations

Hardware triggered groups and software triggered groups cannot function in parallel - not supported by ADC hardware on Kinetis.

The Adc hardware unit id should be the same for one logical unit id in all variants to ensure that the data for channel limit checking configuration is generated correctly.

If the channels assignment are different between variants, the symbolic names will be inconsistent.

3.6 Driver usage and configuration tips

3.6.1 DMA transfer

Adc driver provides the DMA transfer mechanism for transferring directly the conversion results from data registers to system memory via Direct Memory Access (DMA). This is opposed to Interrupt transfer mode, when ADC driver code moves the data from registers to user buffer. This feature can be configured independently for each ADC HW unit.

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. The buffer containing conversion results should be declared within **NO_CACHEABLE** section.

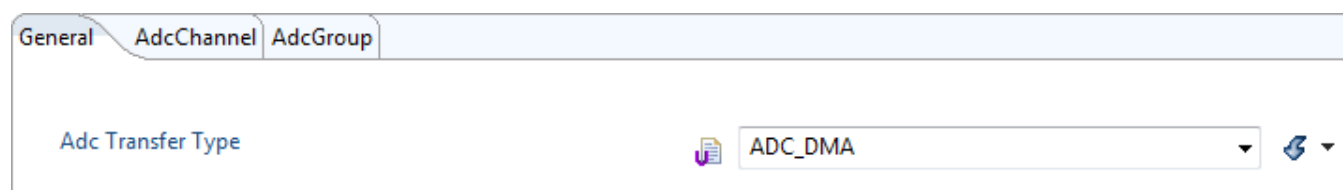
Configuration-time-prerequisites:

- *AdcEnableDmaTransferMode* needs to be enabled in NonAutosar container:

Adc Global Enable DMA Transfer



- Configured AdcTransferType as ADC_DMA in AdcHwUnit container:



- In Mcl module, enable *MclDMAChannelEnable* and configure *DmaSource* to the corresponding Adc Unit. The *MclDmaTransferCompletionNotif* needs to be configured as the corresponding interrupt in Adc driver. For more details, see *chapter 5.3 - ISR to configure within OS – dependencies*.

Mcl Dma Transfer Completion User Notification*

Adc_Adc12bsarv2_DmaTransferComple1

DMA Channel Enable*



DMA Source 0*

ADC1_COCO

3.6.2 Calibration

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.

Adc_Calibrate API will return in pStatus parameter the status E_OK/E_NOT_OK depending if calibration was successful or not. If the hardware supports it, the status of individual BIST steps will also be reported. Please refer chapter 43.6.10.1 Calibration (High Accuracy mode) in Reference Manual of the microcontroller to see more details.

Prototype: `void Adc_Calibrate (VAR (Adc_HwUnitType, AUTOMATIC) Unit,
P2VAR (Adc_CalibrationStatusType, AUTOMATIC, ADC_APPL_DATA) pStatus);`

Configuration-time-prerequisites:

- Enable AdcEnableCalibration in NonAutosar container:

Adc Enable Calibration API*



3.6.3 Changing the Clock and Conversion Timing settings

Adc driver provides API *Adc_SetClockMode* for changing the internal settings of the clock in ADC module.

The conversion timing settings can also be adjusted when this API is called, per Unit or per Group, depending on the configuration of Adc Conversion Time Once parameter – see the associated chapter for more details.

Prototype: `Std_ReturnType Adc_SetClockMode (VAR (Adc_DualClockModeType, AUTOMATIC)
eClockMode);`

Configuration-time-prerequisites:

- Enable AdcEnableDualClockMode in NonAutosar container:

Adc Set Clock Mode API*



3.6.4 Optimizations

The following sections contains driver software optimizations.

3.6.4.1 Without Interrupts group

ADC driver provides without interrupt 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) and the application can retrieve the results by calling `Adc_ReadGroup()`. The user configured result buffer is no longer used to store the results, instead they will be directly read from HW registers, if the flags indicate that the group conversion was completed.

Configuration-time-prerequisites:

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

Adc Group Without Interrupts*



Note: When without interrupt is enable for a group, the group access mode must be **ADC_ACCESS_MODE_SINGLE**.

3.6.4.2 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 `NonAutosar` container:

Adc Optimize OneShot HwTrigger Conversions*



3.6.4.3 Enable Double Buffering Optimization

The ADC driver provides an optional configuration parameter for reducing the number of interrupts required for processing the conversions of Adc Groups and are configured as **ADC_ACCESS_MODE_STREAMING**. Instead of having an interrupt after every sample group conversion, only one interrupt will be raised for a stream of N conversion after all N sample are complete. In addition, one more interrupt will be raised after N/2 sample is complete through enable "Adc Group Enable Half Interrupt" in Adc group.

Adc Group Enable Double Buffering*



Adc Group Enable Half Interrupt*



This option is available only when DMA transfer is used for all hardware unit.

Note: When this feature is used, Adc Optimize OneShot HwTrigger Conversions and Adc Set Channel API must be deactivated due to driver limitations.

In this case of one channel

Configuration-time-prerequisites:

- Enable AdcEnableDoubleBufferingOptimization in NonAutosar container:

Adc Enable Double Buffering Optimization*



- Enable AdcEnableDoubleBuffering in AdcGroup container:

Adc Group Enable Double Buffering*



In this case of more than one channel

Configuration-time-prerequisites:

- Enable DoubleBufferingMoreThanOneChannel in NonAutosar container:

Adc Enable Double Buffering Optimization*



Double Buffering Config More Than One Channel*



Note: Obligatory enable AdcEnableDoubleBufferingOptimization to use DoubleBufferingMoreThanOneChannel.

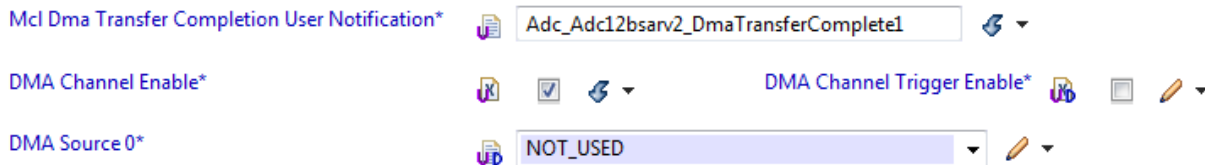
- Enable AdcEnableDoubleBuffering in AdcGroup container:

Adc Group Enable Double Buffering*



- For use double Buffering for group more than one channel, we need to use 2 DMA channel for one hardware unit which have group double buffer more than one channel, channel 1 use to transfer, channel 2 raised interrupt. Interrupt must be enable for DMA channel 2.

Channel 1 configure like in chapter 3.6.1, channel 2 config follow figure bellow



The MclDmaTransferCompletionNotif needs to be configured as the corresponding interrupt in Adc driver

Note: In case Adc config with 2 HW Unit use DMA, if only one HW Unit contain group enable double buffer with number of channel > 1, 3 DMA channel need to use, if both two HW Unit contain group Enable double buffer with number channel > 1, 4 DMA channel need to use.

3.6.4.4 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.

Prototype: `void Adc_SetChannel(Adc_GroupType Group, Adc_GroupDefType pChannel, uint16 pDelays, uint32 u32Mask, Adc_ChannelIndexType NumberOfChannel);`

Configuration-time-prerequisites:

- The AdcEnableSetChannel parameter needs to be enabled in NonAutosar container:

Adc Set Channel API*



- The AdcEnableInitialNotification parameter needs to be enabled in NonAutosar container:

Adc Initial Notification Capability*



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

Adc Group Extra Notification*



Adc_SetChannel API can be called by the user application whenever 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 HW registers. So the very next conversion will not be affected by the changes, but the second next conversion will. To overcome this drawback, a separate, Non-Autosar notification can be configured to be used with Adc_SetChannel feature – the Adc Initial notification. It can be used by the user application to call Adc_SetChannel API before Adc driver updates the HW configuration for the next conversion, avoiding the limitation of Autosar notification.

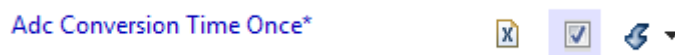
3.6.4.5 Conversion Time Once

ADC driver provides Conversion time once feature to enable/disable one time configuration of the settings that affect configuration time. If this feature is enabled, the timing relevant 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 groups 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 NonAutosar container:



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

AdcNormalConversionTimings

Name*

AdcNormalConversionTimings

Adc Hardware Average Enable*

☒

Adc Hardware Average Select*

SAMPLES_4

Adc Sample Time Duration (2 -> 256)*

2

Adc Clock Divide Select*

DIV_NONE

AdcAlternateConversionTimings

Name*

AdcAlternateConversionTimings

Adc Hardware Average Enable*

☐

Adc Hardware Average Select*

SAMPLES_4

Adc Sample Time Duration (2 -> 256)*

2

Adc Clock Divide Select*

DIV_NONE

3.6.4.6 Bypass Consistency loop

Adc driver provides a mechanism called Bypass Consistency Loop to increase the execution speed when stopping a group. Normally, the Adc driver polls the status of the HW until the conversion is confirmed as stopped. If this setting is used, the status polling is skipped, and the application must make sure to not call an ADC service before the HW reaches the correct state.

Configuration-time-prerequisites:

- Enable `AdcBypassConsistencyLoop` in `NonAutosar` container. When this parameter is enabled, `Queuing` and `Priority` features must be disabled. This feature is applicable only for groups that have `Without Interrupts` feature configured:

`Adc Bypass Consistency Loop*`



Note: When `without interrupt` is enable for a group, the group access mode must be `ADC_ACCESS_MODE_SINGLE`.

3.6.5 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:

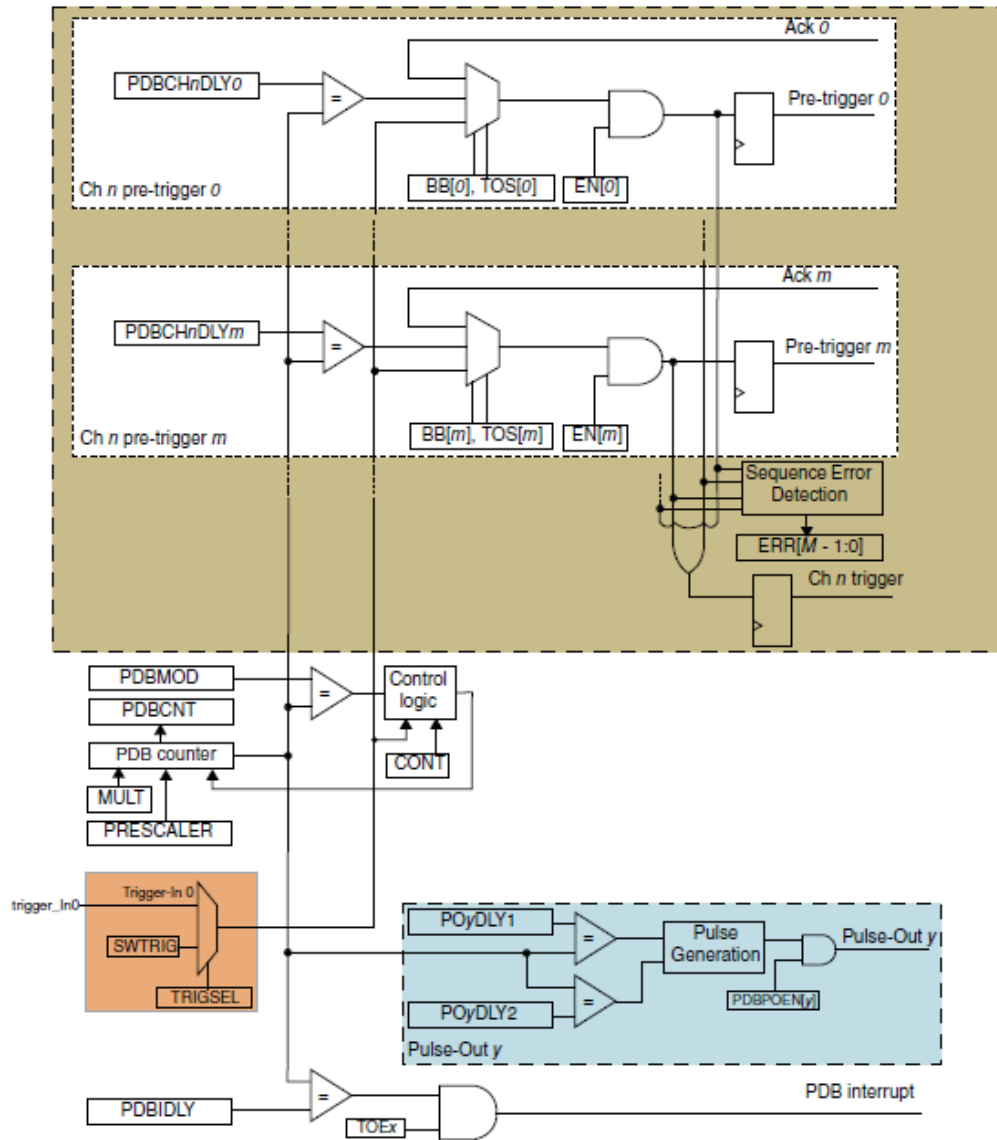







Figure 3-2. PDB block diagram

The PDB pretriggers can work in either Back to Back Mode or work as individual Delays for channel conversions, and the Adc driver offers configuration options for each Adc Group, defining how the PDB should be configured to work:




AdcGroupInBacktoBackMode, AdcGroupUsesChannelDelays, AdcDelayNextPdb.

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.

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:

General			AdcGroupDefinition	AdcChannelDelay
AdcChannelDelay*				
Index		Adc Cha...		
0		50		
1		100		
2		150		
3		200		
4		250		

3.6.5.1 AdcGroupInBacktoBackMode - Enable/Disable the channel conversions occurring in Back to Back mode.

Adc Group In Back to Back Mode*   

When this parameter is enabled, the PDB pretriggers will be configured 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, where N = number of PDB Channels X 8 pretriggers each; for groups larger 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 for the 2nd, 3rd 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 **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.

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

Adc Group Uses 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 = number of PDB Channels X 8 pretriggers each; for groups larger 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, 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 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 **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, 3rd PDB channel to avoid PDB internal errors.

3.6.5.3 AdcDelayNextPdb – configuring the delay between PDB channel conversions

Adc Delay Next PDB (0 -> 65535)*



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)`.

3.6.5.4 PDB Unit settings

There is a PDB sub-container for configuring general PDB unit settings.

Name	Value
Adc Pdb Prescaler Divider Select (0 -> 7)	0
Adc Pdb Multiplication Factor Select for Prescaler (0 -> 3)	0
PDB Sequence Error Interrupt Enable	<input checked="" type="checkbox"/>
PDB Sequence Error Notification	NULL_PTR

`AdcPdbPrescalerDividerSelect` and `AdcPdbMultiplicationFactorSelect` 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 `PRESCALAR` field), or in other words, $(\text{peripheral clock}) / (\text{MULT} \times \text{PRESCALAR})$. For more details about the implementation of these bitfields in the hardware please check the Reference Manual.

Setting `AdcPdbChannelSequenceErrorEnable` enables the PDB sequence error interrupt - any of the PDB channel sequence error flags will generate a 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 notification function can be configured in `AdcPdbErrorNotification` field.

3.7 Runtime Errors

The driver generates the following DEM errors at runtime.

Table 3-3. Runtime Errors

Function	Error Code	Condition triggering the error
<code>Adc_StartGroupConversion</code>	<code>Adc_E_Timeout</code>	Timeout expired. Ongoing conversion is not aborted.
<code>Adc_StopGroupConversion</code>	<code>Adc_E_Timeout</code>	Timeout expired. Ongoing conversion is not aborted.
<code>Adc_Calibrate</code>	<code>Adc_E_Timeout</code>	Timeout expired. Calibrate not success.

3.8 Software specification

The following sections contains driver software specifications.

3.8.1 Define Reference

Constants supported by the driver are as per AUTOSAR Adc Driver software specification Version 4.2 Rev0002 .

3.8.1.1 Define `ADC_VENDOR_ID`

Table 3-4. Define `ADC_VENDOR_ID` Description

Name	<code>ADC_VENDOR_ID</code>
Initializer	43

3.8.1.2 Define ADC_MODULE_ID

Table 3-5. Define ADC_MODULE_ID Description

Name	ADC_MODULE_ID
Initializer	123

3.8.1.3 Define ADC_AR_RELEASE_MAJOR_VERSION

Table 3-6. Define ADC_AR_RELEASE_MAJOR_VERSION Description

Name	ADC_AR_RELEASE_MAJOR_VERSION
Initializer	4

3.8.1.4 Define ADC_AR_RELEASE_MINOR_VERSION

Table 3-7. Define ADC_AR_RELEASE_MINOR_VERSION Description

Name	ADC_AR_RELEASE_MINOR_VERSION
Initializer	2

3.8.1.5 Define ADC_AR_RELEASE_REVISION_VERSION

Violates: The compiler/linker shall be checked to ensure that 31 character significance and case sensitivity are supported for external identifiers

Table 3-8. Define ADC_AR_RELEASE_REVISION_VERSION Description

Name	ADC_AR_RELEASE_REVISION_VERSION
Initializer	2

3.8.1.6 Define ADC_SW_MAJOR_VERSION

Table 3-9. Define ADC_SW_MAJOR_VERSION Description

Name	ADC_SW_MAJOR_VERSION
Initializer	1

3.8.1.7 Define ADC_SW_MINOR_VERSION

Table 3-10. Define ADC_SW_MINOR_VERSION Description

Name	ADC_SW_MINOR_VERSION
Initializer	0

3.8.1.8 Define ADC_SW_PATCH_VERSION

Table 3-11. Define ADC_SW_PATCH_VERSION Description

Name	ADC_SW_PATCH_VERSION
Initializer	1

3.8.1.9 Define ADC_E_UNINIT

API service used without Adc module initialization.

Details:

All error codes

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

Table 3-12. Define ADC_E_UNINIT Description

Name	ADC_E_UNINIT
Initializer	((uint8)0x0AU)

3.8.1.10 Define ADC_E_BUSY

Adc module is busy with a running operation.

Table 3-13. Define ADC_E_BUSY Description

Name	ADC_E_BUSY
Initializer	((uint8)0x0BU)

3.8.1.11 Define ADC_E_IDLE

Adc module is in idle state.

Table 3-14. Define ADC_E_IDLE Description

Name	ADC_E_IDLE
Initializer	((uint8)0x0CU)

3.8.1.12 Define ADC_E_ALREADY_INITIALIZED

The ADC module is already initilized.

Table 3-15. Define ADC_E_ALREADY_INITIALIZED Description

Name	ADC_E_ALREADY_INITIALIZED
Initializer	((uint8)0x0DU)

3.8.1.13 Define ADC_E_PARAM_CONFIG

The ADC module is not properly configured.

Table 3-16. Define ADC_E_PARAM_CONFIG Description

Name	ADC_E_PARAM_CONFIG
Initializer	((uint8)0x0EU)

3.8.1.14 Define ADC_E_PARAM_POINTER

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

Table 3-17. Define ADC_E_PARAM_POINTER Description

Name	ADC_E_PARAM_POINTER
Initializer	((uint8)0x14U)

3.8.1.15 Define ADC_E_PARAM_GROUP

API service used with an invalid ADC group.

Table 3-18. Define ADC_E_PARAM_GROUP Description

Name	ADC_E_PARAM_GROUP
Initializer	((uint8)0x15U)

3.8.1.16 Define ADC_E_WRONG_CONV_MODE

API service used with an invalid ADC Conversion Mode.

Table 3-19. Define ADC_E_WRONG_CONV_MODE Description

Name	ADC_E_WRONG_CONV_MODE
Initializer	((uint8)0x16U)

3.8.1.17 Define ADC_E_WRONG_TRIGG_SRC

API service used with an invalid ADC Trigger Source.

Table 3-20. Define ADC_E_WRONG_TRIGG_SRC Description

Name	ADC_E_WRONG_TRIGG_SRC
Initializer	((uint8)0x17U)

3.8.1.18 Define ADC_E_NOTIF_CAPABILITY

Check the notification capability of a group.

**Table 3-21. Define ADC_E_NOTIF_CAPABILITY
Description**

Name	ADC_E_NOTIF_CAPABILITY
Initializer	((uint8)0x18U)

3.8.1.19 Define ADC_E_BUFFER_UNINIT

API service used without initializing the buffer.

Table 3-22. Define ADC_E_BUFFER_UNINIT Description

Name	ADC_E_BUFFER_UNINIT
Initializer	((uint8)0x19U)

3.8.1.20 Define ADC_E_NOT_DISENGAGED

One or more ADC group/channel not in IDLE state.

Table 3-23. Define ADC_E_NOT_DISENGAGED Description

Name	ADC_E_NOT_DISENGAGED
Initializer	((uint8)0x1AU)

3.8.1.21 Define ADC_E_POWER_STATE_NOT_SUPPORTED

Unsupported power state request.

**Table 3-24. Define ADC_E_POWER_STATE_NOT_SUPPORTED
Description**

Name	ADC_E_POWER_STATE_NOT_SUPPORTED
Initializer	((uint8)0x1BU)

3.8.1.22 Define ADC_E_TRANSITION_NOT_POSSIBLE

Requested power state can not be reached directly.

Table 3-25. Define ADC_E_TRANSITION_NOT_POSSIBLE
Description

Name	ADC_E_TRANSITION_NOT_POSSIBLE
Initializer	((uint8)0x1CU)

3.8.1.23 Define ADC_E_PERIPHERAL_NOT_PREPARED

ADC not prepared for target power state.

Table 3-26. Define ADC_E_PERIPHERAL_NOT_PREPARED
Description

Name	ADC_E_PERIPHERAL_NOT_PREPARED
Initializer	((uint8)0x1DU)

3.8.1.24 Define ADC_E_QUEUE_FULL

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

Table 3-27. Define ADC_E_QUEUE_FULL
Description

Name	ADC_E_QUEUE_FULL
Initializer	((uint8)0x20U)

3.8.1.25 Define ADC_E_PARAM_UNIT

API service called using a wrong ADC unit.

Table 3-28. Define ADC_E_PARAM_UNIT Description

Name	ADC_E_PARAM_UNIT
Initializer	((uint8)0x27U)

3.8.1.26 Define ADC_E_INVALID_CLOCK_MODE

Adc_SetClockMode service called using an invalid clock mode.

Table 3-29. Define ADC_E_INVALID_CLOCK_MODE Description

Name	ADC_E_INVALID_CLOCK_MODE
Initializer	((uint8)0x2AU)

3.8.1.27 Define ADC_E_PARAM_CHANNEL

Adc_SetChannel service called using an invalid channel list.

Table 3-30. Define ADC_E_PARAM_CHANNEL Description

Name	ADC_E_PARAM_CHANNEL
Initializer	((uint8)0x2BU)

3.8.1.28 Define ADC_E_BUFFER_UNINIT_LIST

Table 3-31. Define ADC_E_BUFFER_UNINIT_LIST Description

Name	ADC_E_BUFFER_UNINIT_LIST
Initializer	((uint32)0x00000001U)

3.8.1.29 Define ADC_E_WRONG_TRIGG_SRC_LIST

Table 3-32. Define ADC_E_WRONG_TRIGG_SRC_LIST Description

Name	ADC_E_WRONG_TRIGG_SRC_LIST
Initializer	((uint32)0x00000002U)

3.8.1.30 Define ADC_E_QUEUE_FULL_LIST

Table 3-33. Define ADC_E_QUEUE_FULL_LIST Description

Name	ADC_E_QUEUE_FULL_LIST
Initializer	((uint32)0x00000004U)

3.8.1.31 Define ADC_E_WRONG_CONV_MODE_LIST

Table 3-34. Define ADC_E_WRONG_CONV_MODE_LIST
Description

Name	ADC_E_WRONG_CONV_MODE_LIST
Initializer	((uint32)0x00000008U)

3.8.1.32 Define ADC_E_WRONG_ENABLE_CH_DISABLE_CH_GROUP_LIST

Violates: Identifier exceeds 31 characters

Table 3-35. Define ADC_E_WRONG_ENABLE_CH_DISABLE_CH_GROUP_LIST
Description

Name	ADC_E_WRONG_ENABLE_CH_DISABLE_CH_GROUP_LIST
Initializer	((uint32)0x00000010U)

3.8.1.33 Define ADC_E_WRONG_ENABLE_CH_DISABLE_CH_ID_LIST

Violates: Identifier exceeds 31 characters

Table 3-36. Define ADC_E_WRONG_ENABLE_CH_DISABLE_CH_ID_LIST
Description

Name	ADC_E_WRONG_ENABLE_CH_DISABLE_CH_ID_LIST
Initializer	((uint32)0x00000020U)

3.8.1.34 Define ADC_E_SET_MODE_LIST

Table 3-37. Define ADC_E_SET_MODE_LIST Description

Name	ADC_E_SET_MODE_LIST
Initializer	((uint32)0x00000040U)

3.8.1.35 Define ADC_INIT_ID

API service ID for Adc_Init function.

Details:

All AUTOSAR API's service IDs

Table 3-38. Define ADC_INIT_ID Description

Name	ADC_INIT_ID
Initializer	0x00U

3.8.1.36 Define ADC_DEINIT_ID

API service ID for Adc_DeInit function.

Table 3-39. Define ADC_DEINIT_ID Description

Name	ADC_DEINIT_ID
Initializer	0x01U

3.8.1.37 Define ADC_STARTGROUPCONVERSION_ID

API service ID for Adc_StartGroupConversion function.

Table 3-40. Define ADC_STARTGROUPCONVERSION_ID Description

Name	ADC_STARTGROUPCONVERSION_ID
Initializer	0x02U

3.8.1.38 Define ADC_STOPGROUPCONVERSION_ID

API service ID for Adc_StopGroupConversion function.

Table 3-41. Define ADC_STOPGROUPCONVERSION_ID Description

Name	ADC_STOPGROUPCONVERSION_ID
Initializer	0x03U

3.8.1.39 Define ADC_VALUEREADGROUP_ID

API service ID for Adc_ReadGroup function.

Table 3-42. Define ADC_VALUEREADGROUP_ID Description

Name	ADC_VALUEREADGROUP_ID
Initializer	0x04U

3.8.1.40 Define ADC_ENABLEHARDWARETRIGGER_ID

API service ID for Adc_EnableHardwareTrigger function.

Table 3-43. Define ADC_ENABLEHARDWARETRIGGER_ID Description

Name	ADC_ENABLEHARDWARETRIGGER_ID
Initializer	0x05U

3.8.1.41 Define ADC_DISABLEHARDWARETRIGGER_ID

API service ID for Adc_DisableHardwareTrigger function.

Table 3-44. Define ADC_DISABLEHARDWARETRIGGER_ID Description

Name	ADC_DISABLEHARDWARETRIGGER_ID
Initializer	0x06U

3.8.1.42 Define ADC_ENABLEGROUPNOTIFICATION_ID

API service ID for Adc_EnableGroupNotification function.

Table 3-45. Define ADC_ENABLEGROUPNOTIFICATION_ID Description

Name	ADC_ENABLEGROUPNOTIFICATION_ID
Initializer	0x07U

3.8.1.43 Define ADC_DISABLEGROUPNOTIFICATION_ID

API service ID for Adc_DisableGroupNotification function.

Table 3-46. Define ADC_DISABLEGROUPNOTIFICATION_ID Description

Name	ADC_DISABLEGROUPNOTIFICATION_ID
Initializer	0x08U

3.8.1.44 Define ADC_GETGROUPSTATUS_ID

API service ID for Adc_GetGroupStatus function.

Table 3-47. Define ADC_GETGROUPSTATUS_ID Description

Name	ADC_GETGROUPSTATUS_ID
Initializer	0x09U

3.8.1.45 Define ADC_GETVERSIONINFO_ID

API service ID for Adc_GetVersionInfo function.

Table 3-48. Define ADC_GETVERSIONINFO_ID Description

Name	ADC_GETVERSIONINFO_ID
Initializer	0x0AU

3.8.1.46 Define ADC_GETSTREAMLASTPOINTER_ID

API service ID for Adc_GetStreamLastPointer function.

Table 3-49. Define ADC_GETSTREAMLASTPOINTER_ID Description

Name	ADC_GETSTREAMLASTPOINTER_ID
Initializer	0x0BU

3.8.1.47 Define ADC_SETUPRESULTBUFFER_ID

API service ID for Adc_SetupResultBuffer function.

Table 3-50. Define ADC_SETUPRESULTBUFFER_ID Description

Name	ADC_SETUPRESULTBUFFER_ID
Initializer	0x0CU

3.8.1.48 Define ADC_SETPOWERSTATE_ID

API service ID for Adc_SetPowerState function.

Table 3-51. Define ADC_SETPOWERSTATE_ID Description

Name	ADC_SETPOWERSTATE_ID
Initializer	0x10U

3.8.1.49 Define ADC_GETCURRENTPOWERSTATE_ID

API service ID for Adc_GetCurrentPowerState function.

Table 3-52. Define ADC_GETCURRENTPOWERSTATE_ID Description

Name	ADC_GETCURRENTPOWERSTATE_ID
Initializer	0x11U

3.8.1.50 Define ADC_GETTARGETPOWERSTATE_ID

API service ID for Adc_GetTargetPowerState function.

Table 3-53. Define ADC_GETTARGETPOWERSTATE_ID Description

Name	ADC_GETTARGETPOWERSTATE_ID
Initializer	0x12U

3.8.1.51 Define ADC_PREPAREPOWERSTATE_ID

API service ID for Adc_PreparePowerState function.

Table 3-54. Define ADC_PREPAREPOWERSTATE_ID Description

Name	ADC_PREPAREPOWERSTATE_ID
Initializer	0x13U

3.8.1.52 Define ADC_SETCLOCKMODE_ID

API service ID for Adc_SetClockMode function.

Table 3-55. Define ADC_SETCLOCKMODE_ID Description

Name	ADC_SETCLOCKMODE_ID
Initializer	0x24U

3.8.1.53 Define ADC_CALIBRATE_ID

API service ID for Adc_Calibrate function.

Table 3-56. Define ADC_CALIBRATE_ID Description

Name	ADC_CALIBRATE_ID
Initializer	0x28U

3.8.1.54 Define ADC_SETCANNEL_ID

API service ID for Adc_SetChannel function.

Table 3-57. Define ADC_SETCHANNEL_ID Description

Name	ADC_SETCHANNEL_ID
Initializer	(0x31U)

3.8.2 Enum Reference

Enumeration of all constants supported by the driver are as per AUTOSAR Adc Driver software specification Version 4.2 Rev0002 .

3.8.2.1 Enumeration Adc_GlobalStateType

ADC driver status.

Details:

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

Table 3-58. Enumeration Adc_GlobalStateType Values

Name	Initializer	Description
ADC_STATE_UNINIT	0U	
ADC_STATE_BUSY		
ADC_STATE_IDLE		

3.8.2.2 Enumeration Adc_DualClockModeType

Group Access Mode type.

Details:

Used for value received by Tressos interface configuration.

Table 3-59. Enumeration Adc_DualClockModeType Values

Name	Initializer	Description
ADC_NORMAL	0U	Normal mode.

Table continues on the next page...

Table 3-59. Enumeration Adc_DualClockModeType Values (continued)

Name	Initializer	Description
ADC_ALTERNATE		Alternate mode.

3.8.2.3 Enumeration Adc_GroupConversionStateType

ADC group already converted type.

Details:

Used to differentiate if group is already converted or not.

Table 3-60. Enumeration Adc_GroupConversionStateType Values

Name	Initializer	Description
ADC_NOT_YET_CONVERTED	0U	Group not yet converted.
ADC_ALREADY_CONVERTED		Group is already converted.

3.8.2.4 Enumeration Adc_GroupAccessModeType

Adc group access Mode.

Details:

Used for value received by Tressos interface configuration.

Table 3-61. Enumeration Adc_GroupAccessModeType Values

Name	Initializer	Description
ADC_ACCESS_MODE_SINGLE	0U	Single access mode.
ADC_ACCESS_MODE_STREAMING		Streaming access mode.

3.8.2.5 Enumeration Adc_GroupConvType

Adc group conversion.

Details:

Used for value received by Tressos interface configuration.

Table 3-62. Enumeration Adc_GroupConvType Values

Name	Initializer	Description
ADC_CONV_TYPE_NORMAL	0U	Normal conversion mode.
ADC_CONV_TYPE_INJECTED		Injected conversion mode.

3.8.2.6 Enumeration Adc_GroupConvModeType

Adc Group conversion mode.

Details:

Used for value received by Tressos interface configuration.

Table 3-63. Enumeration Adc_GroupConvModeType Values

Name	Initializer	Description
ADC_CONV_MODE_ONESHOT	0U	One shot.
ADC_CONV_MODE_CONTINUOUS		Continuous conversion mode.

3.8.2.7 Enumeration Adc_GroupReplacementType

Adc group replacement.

Details:

Used for value received by Tressos interface configuration.

Table 3-64. Enumeration Adc_GroupReplacementType Values

Name	Initializer	Description
ADC_GROUP_REPL_ABORT_RESTART		Abort and restart of group.
ADC_GROUP_REPL_SUSPEND_RESUME		Suspend and resuming of group.

3.8.2.8 Enumeration `Adc_StreamBufferModeType`

Adc group streaming buffer mode.

Details:

Used for value received by Tressos interface configuration.

Table 3-65. Enumeration `Adc_StreamBufferModeType` Values

Name	Initializer	Description
<code>ADC_STREAM_BUFFER_LINEAR</code>	0U	Linear streaming.
<code>ADC_STREAM_BUFFER_CIRCULAR</code>		Circular streaming.

3.8.2.9 Enumeration `Adc_StatusType`

ADC group status.

Details:

ADC group enumeration type.

Table 3-66. Enumeration `Adc_StatusType` Values

Name	Initializer	Description
<code>ADC_IDLE</code>	0U	Group is in IDLE state.
<code>ADC_BUSY</code>		Group is in BUSY state.
<code>ADC_COMPLETED</code>		Group is in COMPLETED state.
<code>ADC_STREAM_COMPLETED</code>		Group is in STREAM_COMPLETED state.

3.8.2.10 Enumeration `Adc_NotificationType`

ADC group notification.

Details:

Indicates if notification is enabled for the group.

Table 3-67. Enumeration Adc_NotificationType Values

Name	Initializer	Description
ADC_NOTIFICATION_DISABLED	0U	Notification is disabled.
ADC_NOTIFICATION_ENABLED		Notification is enabled.

3.8.2.11 Enumeration Adc_HwTriggerSignalType

Adc hardware trigger edge.

Details:

Used for value received by Tressos interface configuration.

Table 3-68. Enumeration Adc_HwTriggerSignalType Values

Name	Initializer	Description
ADC_HW_TRIG_RISING_EDGE	0U	Rising edge.
ADC_HW_TRIG_FALLING_EDGE		Falling edge.
ADC_HW_TRIG_BOTH_EDGES		Falling and rising edge.

3.8.2.12 Enumeration Adc_TriggerSourceType

Adc hardware trigger source.

Details:

Used for value received by Tressos interface configuration.

Table 3-69. Enumeration Adc_TriggerSourceType Values

Name	Initializer	Description
ADC_TRIGG_SRC_SW	0U	Software triggered.
ADC_TRIGG_SRC_HW		Hardware triggered.

3.8.2.13 Enumeration Adc_HwTriggeringType

Adc Hardware trigger.

Details:

Indicates if hardware trigger is enabled for group.

Table 3-70. Enumeration Adc_HwTriggeringType Values

Name	Initializer	Description
ADC_HWTRIGGER_DISABLED	0U	Hardware trigger is disabled.
ADC_HWTRIGGER_ENABLED		Hardware trigger is enabled.

3.8.2.14 Enumeration Adc_ChannelRangeSelectType

Range select values.

Details:

Indicates which range select is used.

Table 3-71. Enumeration Adc_ChannelRangeSelectType Values

Name	Initializer	Description
ADC_RANGE_ALWAYS	0U	Complete range - independent from channel limit settings.
ADC_RANGE_BETWEEN		Range between low limit and high limit - high limit value included.
ADC_RANGE_NOT_BETWEEN		Range above high limit or below low limit - low limit value included.
ADC_RANGE_NOT_OVER_HIGH		Range below high limit - high limit value included.
ADC_RANGE_NOT_UNDER_LOW		Range above low limit.
ADC_RANGE_OVER_HIGH		Range above high limit.
ADC_RANGE_UNDER_LOW		Below low limit - low limit value included.

3.8.3 Function Reference

Functions of all functions supported by the driver are as per AUTOSAR Adc Driver software specification Version 4.2 Rev0002 .

3.8.3.1 Function Adc_Init

Initializes the ADC hardware unit and the driver.

Details:

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

Return: void.

Post: Initializes the driver.

Note

The function Autosar Service ID[hex]: 0x00.Synchronous.Non Re-entrant function.

Implements: Adc_Init_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Violates: Only preprocessor statements and comments before "#include"

Violates: Repeated include file MemMap.h

Prototype: void Adc_Init(const Adc_ConfigType *ConfigPtr);

Table 3-72. Adc_Init Arguments

Type	Name	Direction	Description
	pConfigPtr	input	Pointer to configuration set in Variant PB (Variant PC requires a NULL_PTR).

3.8.3.2 Function Adc_DeInit

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

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x01.Synchronous.Non Re-entrant function.

Implements: Adc_DeInit_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_DeInit(void);

3.8.3.3 Function Adc_SetupResultBuffer

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

Details:

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.

Return: Std_ReturnType Standard return type.

Note

The function Autosar Service ID[hex]: 0x0C.Synchronous.Re-entrant function.

Implements: Adc_SetupResultBuffer_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: Std_ReturnType Adc_SetupResultBuffer(Adc_GroupType Group, Adc_ValueGroupType *DataBufferPtr);

Table 3-73. Adc_SetupResultBuffer Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.
	pDataBufferPtr	input	Pointer to result data buffer.

Table 3-74. Adc_SetupResultBuffer Return Values

Name	Description
E_OK:	Result buffer pointer initialized correctly.
E_NOT_OK:	Operation failed or development error occurred.

3.8.3.4 Function Adc_EnableGroupNotification

Enables the notification mechanism for the requested ADC channel group.

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x07.Synchronous.Re-entrant function.

Implements: Adc_EnableGroupNotification_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_EnableGroupNotification(Adc_GroupType Group);

Table 3-75. Adc_EnableGroupNotification Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.5 Function Adc_DisableGroupNotification

Disables the notification mechanism for the requested ADC channel group.

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x08.Synchronous.Re-entrant function.

Implements: Adc_DisableGroupNotification_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_DisableGroupNotification(Adc_GroupType Group);

Table 3-76. Adc_DisableGroupNotification Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.6 Function Adc_EnableHardwareTrigger

Enables the hardware trigger for the requested ADC Channel group.

Details:

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.

Return: void.

Note

The function Autosar Service ID[hex]: 0x05.Synchronous.Re-entrant function.

Implements: Adc_EnableHardwareTrigger_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_EnableHardwareTrigger(Adc_GroupType Group);

Table 3-77. Adc_EnableHardwareTrigger Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.7 Function Adc_DisableHardwareTrigger

Disables the hardware trigger for the requested ADC Channel group.

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x06.Synchronous.Re-entrant function.

Implements: Adc_DisableHardwareTrigger_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_DisableHardwareTrigger(Adc_GroupType Group);

Table 3-78. Adc_DisableHardwareTrigger Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.8 Function **Adc_StartGroupConversion**

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

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x02.Asynchronous.Re-entrant function.

Implements: Adc_StartGroupConversion_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_StartGroupConversion(Adc_GroupType Group);

Table 3-79. Adc_StartGroupConversion Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.9 Function **Adc_StopGroupConversion**

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

Details:

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

Return: void.

Note

The function Autosar Service ID[hex]: 0x03.Synchronous.Re-entrant function.

Implements: Adc_StopGroupConversion_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: `void Adc_StopGroupConversion(Adc_GroupType Group);`

Table 3-80. Adc_StopGroupConversion Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

3.8.3.10 Function Adc_GetGroupStatus

Returns the conversion status of the requested ADC Channel group.

Details:

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

Return: Adc_StatusType Conversion status for the requested group.

Note

The function Autosar Service ID[hex]: 0x09.Synchronous.Re-entrant function.

Implements: Adc_GetGroupStatus_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: `Adc_StatusType Adc_GetGroupStatus(Adc_GroupType Group);`

Table 3-81. Adc_GetGroupStatus Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC channel group.

Table 3-82. Adc_GetGroupStatus Return Values

Name	Description
ADC_IDLE	In case of errors.
conversion	Status in case of no errors.

3.8.3.11 Function `Adc_GetStreamLastPointer`

Returns the number of valid samples per channel.

Details:

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).

Return: `Adc_StreamNumSampleType` Number of valid samples per channel.

Note

The function Autosar Service ID[hex]:
0x0B.Synchronous.Reentrant function.

Implements: `Adc_GetStreamLastPointer_Activity`

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: `Adc_StreamNumSampleType Adc_GetStreamLastPointer(Adc_GroupType Group, Adc_ValueGroupType **PtrToSamplePtr);`

Table 3-83. `Adc_GetStreamLastPointer` Arguments

Type	Name	Direction	Description
<code>Adc_GroupType</code>	Group	input	Numeric ID of requested ADC channel group.
<code>Adc_ValueGroupType**</code>	PtrToSamplePtr	output	Pointer to result buffer pointer.

Table 3-84. `Adc_GetStreamLastPointer` Return Values

Name	Description
0	In case of errors.
>0	Number of valid samples per channel.

3.8.3.12 Function Adc_GetVersionInfo

Returns the version information of this module.

Details:

Returns the version information of this module.

Note

The function Autosar Service ID[hex]:
0x0A.Synchronous.Reentrant function.

Implements: Adc_GetVersionInfo_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Violates: The identifiers used in the declaration and definition of a function shall be identical

Prototype: void Adc_GetVersionInfo(Std_VersionInfoType *versionInfo);

Table 3-85. Adc_GetVersionInfo Arguments

Type	Name	Direction	Description
	pVersionInfo	output	Pointer to where to store the version information of this module.

Table 3-86. Adc_GetVersionInfo Return Values

Name	Description
structure	In case of no errors.

3.8.3.13 Function Adc_Calibrate

Executes high accuracy calibration of a ADC HW unit.

Details:

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

Return: void.

Note

The function Service ID[hex]: 0x15.

Implements: Adc_Calibrate_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: void Adc_Calibrate(Adc_HwUnitType Unit, Adc_CalibrationStatusType *pStatus);

Table 3-87. Adc_Calibrate Arguments

Type	Name	Direction	Description
Adc_HwUnitType	Unit	input	ADC Unit Id.
Adc_CalibrationStatusType*	pStatus	input	Status of the ADC HW unit calibration and list of failed and passed tests.

3.8.3.14 Function Adc_SetClockMode

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

Details:

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

Return: Std_ReturnType Standard return type.

Implements: Adc_SetClockMode_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: Std_ReturnType Adc_SetClockMode(Adc_DualClockModeType ClockMode);

Table 3-88. Adc_SetClockMode Arguments

Type	Name	Direction	Description
	eClockMode	input	Normal or Alternate mode.

Table 3-89. Adc_SetClockMode Return Values

Name	Description
E_OK:	In case of successful settings.
E_NOT_OK:	In case of unsuccessful settings.

3.8.3.15 Function `Adc_SetChannel`

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

Details:

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

Note

The function Service ID[hex]: 0x4B.

Implements: `Adc_SetChannel_Activity`

Violates: internal linkage vs external linkage.

Prototype: `void Adc_SetChannel(const Adc_GroupType Group, const Adc_GroupDefType *pChannel, const uint16 *pDelays, const uint32 u32Mask, const Adc_ChannelIndexType NumberOfChannel);`

Table 3-90. `Adc_SetChannel` Arguments

Type	Name	Direction	Description
<code>constAdc_GroupType</code>	Group	input	Group Id.
<code>constAdc_GroupDefType*</code>	pChannel	input	Pointer to channel list array.
<code>constAdc_ChannelIndexType</code>	NumberOfChannel	input	Number of Channel.

3.8.3.16 Function `Adc_ReadGroup`

Reads the group conversion results.

Details:

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).

Return: `Std_ReturnType` Standard return type.

Pre: Preconditions as text description. Optional tag.

Post: Postconditions as text description. Optional tag.

Note

The function Autosar Service ID[hex]:
0x04.Synchronous.Reentrant function.

Implements: Adc_ReadGroup_Activity

Violates: All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required

Prototype: Std_ReturnType Adc_ReadGroup(Adc_GroupType Group, Adc_ValueGroupType *DataBufferPtr) ;

Table 3-91. Adc_ReadGroup Arguments

Type	Name	Direction	Description
Adc_GroupType	Group	input	Numeric ID of requested ADC Channel group.
	pDataBufferPtr	input	ADC results of all channels of the selected group are stored in the data buffer addressed with the pointer.

Table 3-92. Adc_ReadGroup Return Values

Name	Description
E_OK:	Results are available and written to the data buffer.
E_NOT_OK:	No results are available or development error occurred.

3.8.4 Structs Reference

Data structures supported by the driver are as per AUTOSAR Adc Driver software specification Version 4.2 Rev0002 .

3.8.4.1 Structure Adc_CalibrationStatusType

Structure for calibration status.

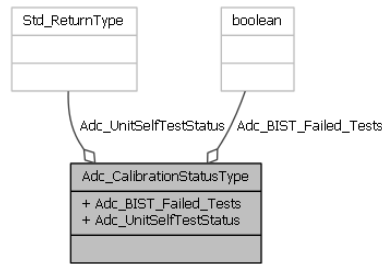


Figure 3-3. Struct Adc_CalibrationStatusType

Declaration:

```

typedef struct
{
    Std_ReturnType Adc_UnitSelfTestStatus
} Adc_CalibrationStatusType;
  
```

Table 3-93. Structure Adc_CalibrationStatusType member description

Member	Description
Adc_UnitSelfTestStatus	Unit calibration result status.

3.8.4.2 Structure Adc_ConfigType

Structure for Configuration data.

Details:

Data structure containing the set of configuration parameters required for initializing the ADC Driver and ADC HW Unit(s).

Implements: Adc_ConfigType_struct

Declaration:

```

typedef struct
{
    const Adc_AdcDig_HwUnitConfigurationType* pAdc,
    const Adc_GroupConfigurationType* pGroups,
    const Adc_AdcDig_ChannelConfigurationType** pChannels,
    Adc_GroupType GroupCount,
    const Adc_AdcDig_MultiConfigType Misc
} Adc_ConfigType;
  
```

Table 3-94. Structure Adc_ConfigType member description

Member	Description
pAdc	Hw unit configurations.
pGroups	Group configurations.

Table continues on the next page...

Table 3-94. Structure `Adc_ConfigType` member description (continued)

Member	Description
<code>pChannels</code>	Channel configurations.
<code>GroupCount</code>	Total number of groups.
<code>Misc</code>	Miscellaneous configuration parameters.

3.8.4.3 Structure `Adc_UnitStatusType`

Structure for hardware unit status.

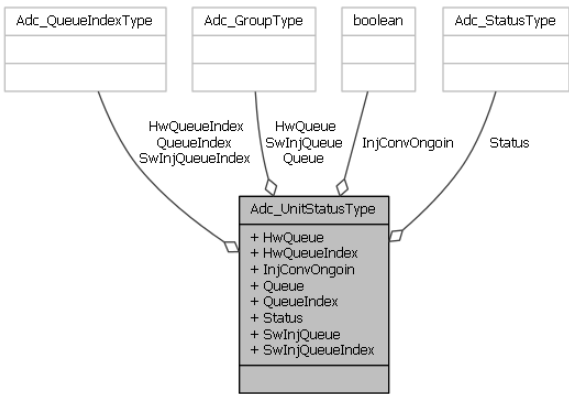


Figure 3-4. Struct `Adc_UnitStatusType`

Details:

This structure contains the HW unit status information.

Declaration:

```
typedef struct
{
    Adc_QueueIndexType SwNormalQueueIndex,
    Adc_GroupType SwNormalQueue[ADC_QUEUE_MAX_DEPTH_MAX],
    Adc_GroupType HwInjectedQueue[ADC_HW_QUEUE],
    Adc_QueueIndexType HwInjectedQueueIndex,
    Adc_GroupType HwNormalQueue[ADC_HW_QUEUE],
    Adc_QueueIndexType HwNormalQueueIndex,
    Adc_GroupType SwInjectedQueue[1],
    Adc_QueueIndexType SwInjectedQueueIndex,
    boolean bCtuControlOngoing
} Adc_UnitStatusType;
```

Table 3-95. Structure `Adc_UnitStatusType` member description

Member	Description
<code>SwNormalQueueIndex</code>	Filled slots in the queue.

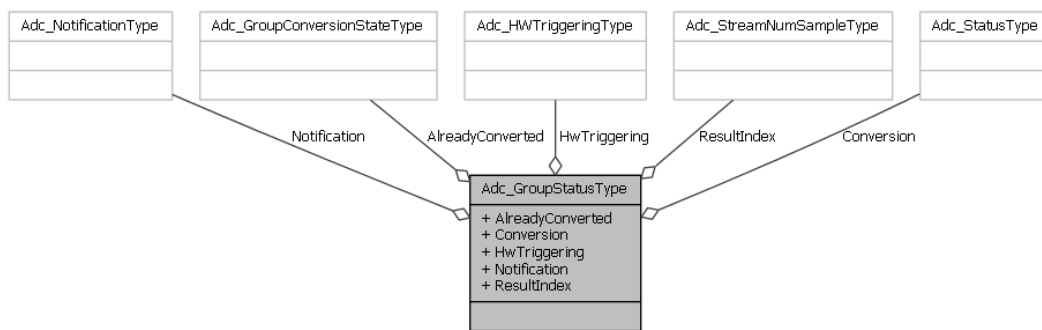
Table continues on the next page...

Table 3-95. Structure Adc_UnitStatusType member description (continued)

Member	Description
SwNormalQueue	Queued groups indexes, always executing Queue[0].
HwInjectedQueue	The depth of the hardware injected queue.
HwInjectedQueueIndex	Filled slots in the Hw injected queue.
HwNormalQueue	The depth of the hardware normal queue.
HwNormalQueueIndex	Filled slots in the Hw normal queue.
SwInjectedQueue	The depth of the software injected queue.
SwInjectedQueueIndex	Filled slots in the Sw injected queue.
bCtuControlOngoing	Indicates Ctu control mode is ongoing.

3.8.4.4 Structure Adc_GroupStatusType

Structure for group status.

**Figure 3-5. Struct Adc_GroupStatusType**

Details:

This structure contains the group status information.

Declaration:

```

typedef struct
{
    Adc_StatusType eConversion,
    Adc_GroupConversionStateType eAlreadyConverted,
    Adc_HwTriggeringType eHwTriggering,
    Adc_HwTriggeringType eCtuTriggering,
    Adc_NotificationType eNotification,
    Adc_StreamNumSampleType ResultIndex,
    boolean bLimitCheckFailed
} Adc_GroupStatusType;
  
```

Table 3-96. Structure `Adc_GroupStatusType` member description

Member	Description
eConversion	Group status.
eAlreadyConverted	Group was previously converted or not.
eHwTriggering	hw trigger enabled/disabled
eCtuTriggering	CTU trigger enabled/disabled.
eNotification	notification enabled/disabled
ResultIndex	index into streaming buffer that is currently being filled
bLimitCheckFailed	check limit check fail

3.8.4.5 Structure Adc_GroupConfigurationType

Structure for group configuration.

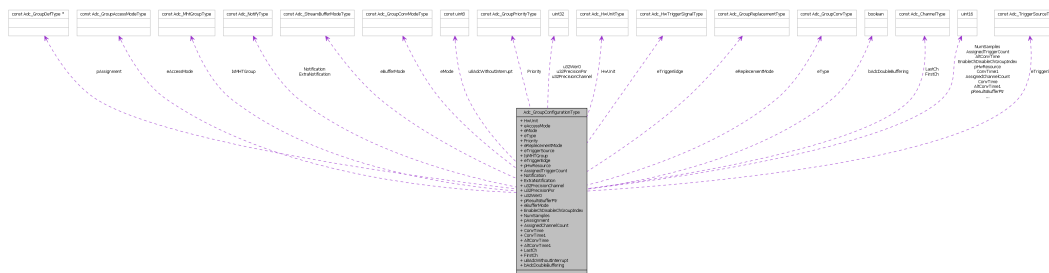


Figure 3-6. Struct Adc_GroupConfigurationType

Declaration:

```
typedef struct
{
    const Adc_HwUnitType HwUnit,
        const Adc_GroupAccessModeType eAccessMode,
        const Adc_GroupConvModeType eMode,
        const Adc_GroupConvType eType,
        const Adc_GroupPriorityType Priority,
        const Adc_GroupReplacementType eReplecementMode,
        const Adc_TriggerSourceType eTriggerSource,
        const Adc_MhtGroupType IsMHTGroup,
        const Adc_HwTriggerSignalType eTriggerEdge,
        const Adc_HwTriggerTimerType* pHwResource,
        const Adc_HwTriggerTimerType AssignedTriggerCount,
        const Adc_NotifyType Notification,
        const Adc_NotifyType ExtraNotification,
        const uint32 u32PrecisionChannel,
        const uint32 u32PrecisionPsr,
        const uint32 u32Wer0,
        Adc_ValueGroupType** pResultsBufferPtr,
        const Adc_StreamBufferModeType eBufferMode,
        const Adc_GroupType EnableChDisableChGroupIndex,
        const Adc_StreamNumSampleType NumSamples,
        const Adc_GroupDefType* pAssignment,
        const Adc_ChannelIndexType AssignedChannelCount,
        const Adc_ConversionTimeType ConvTime,
        const Adc_ConversionTimeType ConvTimel,
```

```

const Adc_ConversionTimeType AltConvTime,
const Adc_ConversionTimeType AltConvTime1,
const Adc_ChannelType LastCh,
const Adc_ChannelType FirstCh,
const uint8 u8AdcWithoutInterrupt,
const boolean bAdcDoubleBuffering
} Adc_GroupConfigurationType;

```

Table 3-97. Structure Adc_GroupConfigurationType member description

Member	Description
HwUnit	Hw unit to which the group belongs to.
eAccessMode	Access Mode.
eMode	Conversion Mode (OneShot/Continuous).
eType	Conversion type (Normal/Injected).
Priority	Priority of group.
eReplcementMode	Replacement Mode.
eTriggerSource	Hw/Sw trigger.
IsMHTGroup	Indicate the group type (Regular or MHT).
eTriggerEdge	Hardware trigger edge.
pHwResource	Resource of the selected hw trigger.
AssignedTriggerCount	Number of trigger source assigned to the group.
Notification	Pointer to notification function.
ExtraNotification	Pointer to extra notification function.
u32PrecisionChannel	ANP0_31, Precision configured channels.
u32PrecisionPsr	Presampling for Precision channels.
u32Wer0	Wer0 for precision channels.
pResultsBufferPtr	pointer to user result buffer array
eBufferMode	Buffer Mode.
EnableChDisableChGroupIndex	Group's index if it has the support to enable/disable channel.
NumSamples	Number of samples.
pAssignment	Assigned channels to group.
AssignedChannelCount	Number of channels.
ConvTime	Conversion time.
ConvTime1	Conversion time CTR1.
AltConvTime	Alternate Conversion time.
AltConvTime1	Alternate conversion time CTR1.
LastCh	Last channel configured.
FirstCh	First channel configured.
u8AdcWithoutInterrupt	Enables or Disables the ADC and DMA interrupts.
bAdcDoubleBuffering	Enables or Disables the ADC double buffering feature.

3.8.4.6 Structure `Adc_RuntimeGroupChannelType`

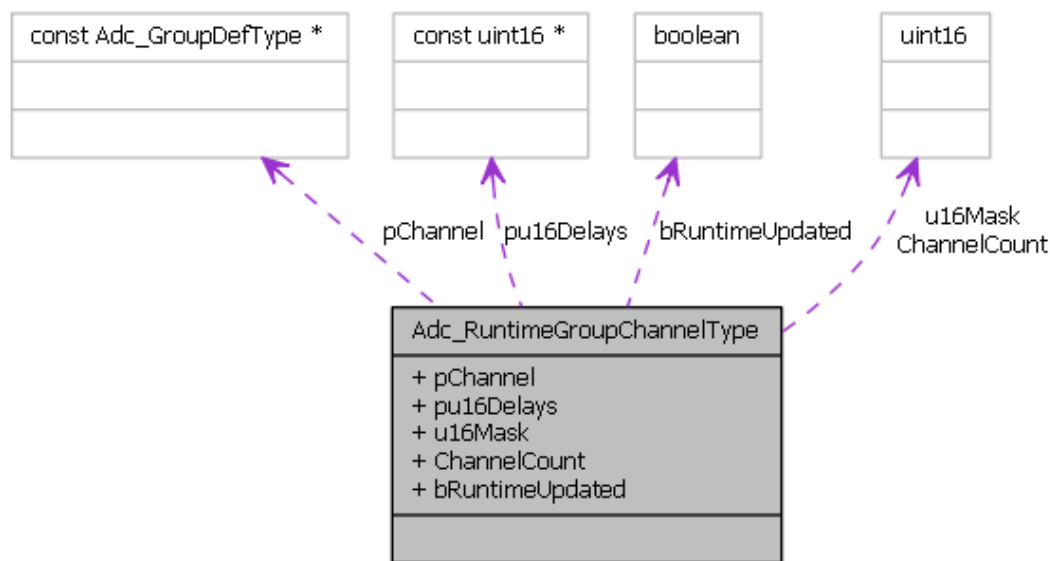


Figure 3-7. Struct `Adc_RuntimeGroupChannelType`

Declaration:

```
typedef struct
{
    constAdc_GroupDefType* pChannel,
    const uint16 * pu16Delays,
    uint32 u32Mask,
    Adc_ChannelIndexType ChannelCount,
    boolean bRuntimeUpdated
} Adc_RuntimeGroupChannelType;
```

Table 3-98. Structure `Adc_RuntimeGroupChannelType` member description

Member	Description
pChannel	Run time assigned channels to group.
pu16Delays	Run time assigned delay of channels group.
u32Mask	Mask per channel - to be updated or not.
ChannelCount	Run time number of channels.
bRuntimeUpdated	Indicates whether the configuration has been updated or not.

3.8.4.7 Structure Adc_ChannelLimitCheckingType

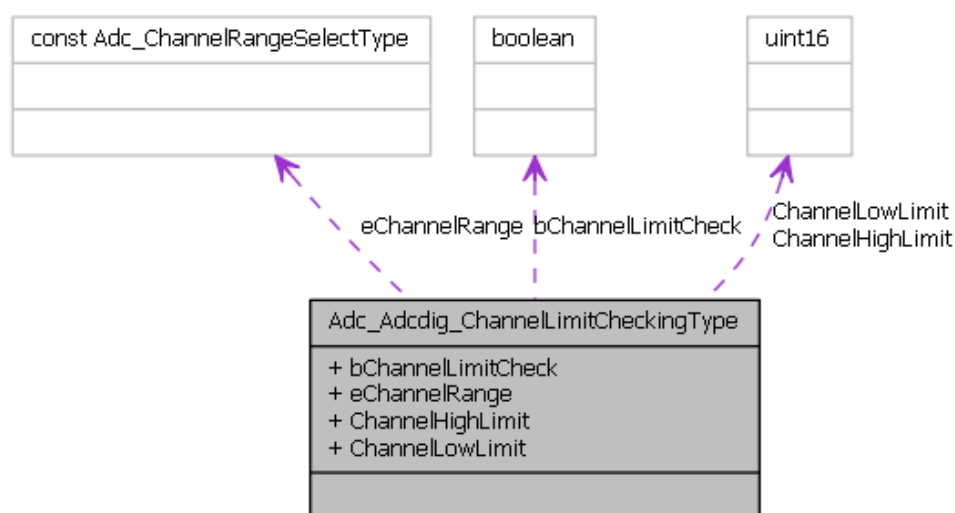


Figure 3-8. Struct Adc_ChannelLimitCheckingType

Declaration:

```

typedef struct
{
    const boolean bChannelLimitCheck,
    const Adc_ChannelRangeSelectType eChannelRange,
    const Adc_ValueGroupType ChannelHighLimit,
    const Adc_ValueGroupType ChannelLowLimit
} Adc_ChannelLimitCheckingType;
  
```

Table 3-99. Structure Adc_ChannelLimitCheckingType member description

Member	Description
bChannelLimitCheck	Channel limit checking feature.
eChannelRange	Range conversion.
ChannelHighLimit	High limit channel conversion value.
ChannelLowLimit	Low limit channel conversion value.

3.8.5 Types Reference

Types supported by the driver are as per AUTOSAR Adc Driver software specification Version 4.2 Rev0002 .

3.9 Symbolic Names Disclaimer

All containers having the symbolic name tag set as true in the Autosar schema will generate defines like:

```
#define <Container_Short_Name> <Container_ID>
```

For this reason it is forbidden to duplicate the name of such containers across the MCAL configuration, 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 Adc Driver. The most of the parameters are described below.

4.1 Configuration elements of Adc

Included forms :

- IMPLEMENTATION_CONFIG_VARIANT
- AdcGeneral
- AdcPublishedInformation
- CommonPublishedInformation
- NonAutosar
- Safety
- AdcDemEventParameterRefs
- AdcConfigSet

Table 4-1. Revision table

Revision	Date
4.3.0	2011-11-24T17:00:00+01:00

4.2 Form IMPLEMENTATION_CONFIG_VARIANT

Configuration classes. Enable the parameters that are editable for specific configuration classes

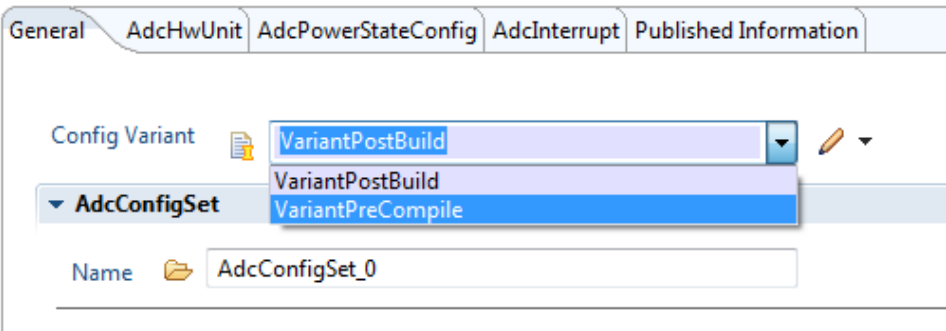


Figure 4-1. Tresos Plugin snapshot for IMPLEMENTATION_CONFIG_VARIANT form.

Table 4-2. Attribute IMPLEMENTATION_CONFIG_VARIANT detailed description

Property	Value
Label	Config Variant
Type	ENUMERATION
Default	VariantPostBuild
Range	VariantPostBuild VariantPreCompile

4.3 Form AdcGeneral

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

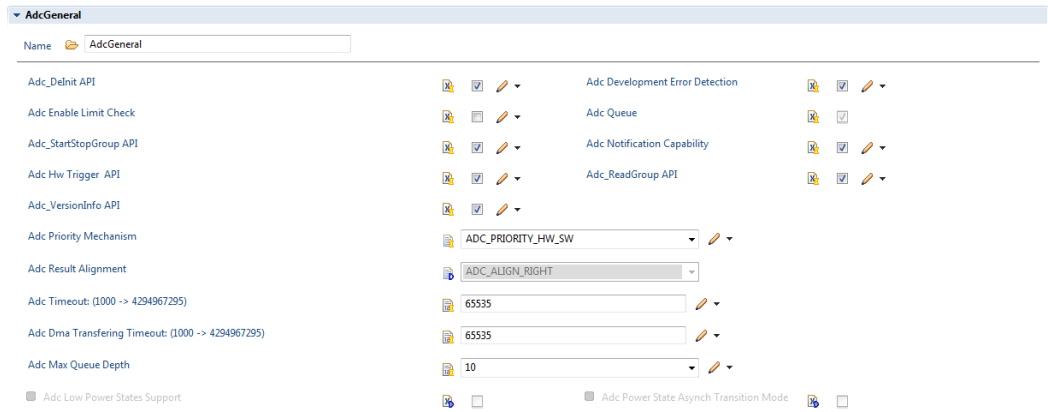


Figure 4-2. Tresos Plugin snapshot for AdcGeneral form.

4.3.1 AdcDeInitApi (AdcGeneral)

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

Table 4-3. Attribute AdcDelnitApi (AdcGeneral) detailed description

Property	Value
Label	Adc_Delnit API
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.2 AdcDevErrorDetect (AdcGeneral)

Enable/Disable Development Error Detection.

Table 4-4. Attribute AdcDevErrorDetect (AdcGeneral) detailed description

Property	Value
Label	Adc Development Error Detection
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.3 AdcEnableLimitCheck (AdcGeneral)

Enable/disable limit checking feature in the ADC driver.

Table 4-5. Attribute AdcEnableLimitCheck (AdcGeneral) detailed description

Property	Value
Label	Adc Enable Limit Check
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.4 AdcEnableQueuing (AdcGeneral)

Enable/Disable the Queue. Note that if AdcPriorityImplementation=ADC_PRIORITY_HW_SW this field is always enabled.

Table 4-6. Attribute AdcEnableQueuing (AdcGeneral) detailed description

Property	Value
Label	Adc Queue
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.5 AdcPriorityQueueMaxDepth (AdcGeneral)

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

Table 4-7. Attribute AdcPriorityQueueMaxDepth (AdcGeneral) detailed description

Property	Value
Label	Adc Max Queue Depth
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	1
Invalid	Range <div style="margin-left: 20px;"> ≤ 1024 ≥ 1 </div>

4.3.6 AdcEnableStartStopGroupApi (AdcGeneral)

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

Table 4-8. Attribute AdcEnableStartStopGroupApi (AdcGeneral) detailed description

Property	Value
Label	Adc_StartStopGroup API
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.7 AdcGrpNotifCapability (AdcGeneral)

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

Table 4-9. Attribute AdcGrpNotifCapability (AdcGeneral) detailed description

Property	Value
Label	Adc Notification Capability
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.8 AdcHwTriggerApi (AdcGeneral)

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

Table 4-10. Attribute AdcHwTriggerApi (AdcGeneral) detailed description

Property	Value
Label	Adc Hw Trigger API
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.9 AdcPriorityImplementation (AdcGeneral)

Select the Priority mechanism. In this version the ADC_PRIORITY_HW isn't used.

Table 4-11. Attribute AdcPriorityImplementation (AdcGeneral) detailed description

Property	Value
Label	Adc Priority Mechanism
Type	ENUMERATION
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_PRIORITY_NONE

Table continues on the next page...

Table 4-11. Attribute AdcPriorityImplementation (AdcGeneral) detailed description (continued)

Property	Value
Range	ADC_PRIORITY_HW ADC_PRIORITY_HW_SW ADC_PRIORITY_NONE

4.3.10 AdcReadGroupApi (AdcGeneral)

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

Table 4-12. Attribute AdcReadGroupApi (AdcGeneral) detailed description

Property	Value
Label	Adc_ReadGroup API
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.11 AdcResultAlignment (AdcGeneral)

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

This feature is not supported by S32K14X's hardware.

Table 4-13. Attribute AdcResultAlignment (AdcGeneral) detailed description

Property	Value
Label	Adc Result Alignment
Type	ENUMERATION
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_ALIGN_RIGHT
Range	ADC_ALIGN_LEFT ADC_ALIGN_RIGHT

4.3.12 AdcVersionInfoApi (AdcGeneral)

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

Table 4-14. Attribute AdcVersionInfoApi (AdcGeneral) detailed description

Property	Value
Label	Adc_VersionInfo API
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	true

4.3.13 AdcTimeout (AdcGeneral)

This is a timeout value which is used to wait till - ADC hardware is disabled - Conversion completed in calibration feature. If the Status is not updated then after this timeout the ADC_E_TIMEOUT production error will be reported and the rest of the functionality will be skipped.

Table 4-15. Attribute AdcTimeout (AdcGeneral) detailed description

Property	Value
Label	Adc Timeout:
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	65535
Invalid	Range <=4294967295 >=1000

4.3.14 AdcLowPowerStatesSupport (AdcGeneral)

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. This parameter is disabled, there is no power management support implemented for this platform.

This is not used by the current implementation

Table 4-16. Attribute AdcLowPowerStatesSupport (AdcGeneral) detailed description

Property	Value
Label	Adc Low Power States Support
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.15 AdcPowerStateAsynchTransitionMode (AdcGeneral)

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

This is not used by the current implementation

Table 4-17. Attribute AdcPowerStateAsynchTransitionMode (AdcGeneral) detailed description

Property	Value
Label	Adc Power State Asynch Transition Mode
Optional	True
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.16 Form AdcPowerStateConfig

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

This is not used by the current implementation

Is included by form : [Form AdcGeneral](#)

4.3.16.1 AdcPowerState (AdcPowerStateConfig)

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.

This is not used by the current implementation

Table 4-18. Attribute AdcPowerState (AdcPowerStateConfig) detailed description

Property	Value
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	true
Default	0
Invalid	Range <div> <div><=18446744073709551615</div> <div>>=0</div> </div>

4.3.16.2 AdcPowerStateReadyCbkRef (AdcPowerStateReadyCbkRefConfig)

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.

This is not used by the current implementation

Table 4-19. Attribute AdcPowerStateReadyCbkRef (AdcPowerStateReadyCbkRefConfig) detailed description

Property	Value
Type	FUNCTION-NAME
Origin	AUTOSAR_ECUC
Symbolic Name	true
Default	NULL_PTR

4.3.17 Form 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.

▼ AdcPublishedInformation

Name

AdcPublishedInformation

Adc Channel Value Signed

false

Adc Group First Channel Fixed

false

Adc Max Channel Resolution

12

Figure 4-3. Tresos Plugin snapshot for AdcPublishedInformation form.

4.3.17.1 AdcChannelValueSigned (AdcPublishedInformation)

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.

Table 4-20. Attribute AdcChannelValueSigned (AdcPublishedInformation) detailed description

Property	Value
Label	Adc Channel Value Signed
Type	BOOLEAN_LABEL
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.17.2 AdcGroupFirstChannelFixed (AdcPublishedInformation)

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.

Table 4-21. Attribute AdcGroupFirstChannelFixed (AdcPublishedInformation) detailed description

Property	Value
Label	Adc Group First Channel Fixed

Table continues on the next page...

Table 4-21. Attribute AdcGroupFirstChannelFixed (AdcPublishedInformation) detailed description (continued)

Property	Value
Type	BOOLEAN_LABEL
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.17.3 AdcMaxChannelResolution (AdcPublishedInformation)

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

Table 4-22. Attribute AdcMaxChannelResolution (AdcPublishedInformation) detailed description

Property	Value
Label	Adc Max Channel Resolution
Type	INTEGER_LABEL
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	12
Invalid	Range <=63 >=1

4.3.18 Form CommonPublishedInformation

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

General

AdcHwUnit

AdcPowerStateConfig

AdcInterrupt

Published Information

▼ CommonPublishedInformation

Name

CommonPublishedInformation

ArReleaseMajorVersion

4

ArReleaseMinorVersion

2

ArReleaseRevisionVersion

2

ModuleId

123

SwMajorVersion

1

SwMinorVersion

0

SwPatchVersion

1

VendorApiInfix

VendorId

43

Figure 4-4. Tresos Plugin snapshot for CommonPublishedInformation form.

4.3.18.1 ArReleaseMajorVersion (CommonPublishedInformation)

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

Table 4-23. Attribute ArReleaseMajorVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	4
Invalid	Range >=4 <=4

4.3.18.2 ArReleaseMinorVersion (CommonPublishedInformation)

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

Table 4-24. Attribute ArReleaseMinorVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	2
Invalid	Range >=2 <=2

4.3.18.3 ArReleaseRevisionVersion (CommonPublishedInformation)

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

Table 4-25. Attribute ArReleaseRevisionVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	2
Invalid	Range >=2 <=2

4.3.18.4 ModuleId (CommonPublishedInformation)

Module ID of this module from Module List.

Table 4-26. Attribute ModuleId (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL

Table continues on the next page...

Table 4-26. Attribute ModuleId (CommonPublishedInformation) detailed description (continued)

Property	Value
Origin	NXP
Symbolic Name	false
Default	123
Invalid	Range <div> <div>>=123</div> <div><=123</div> </div>

4.3.18.5 SwMajorVersion (CommonPublishedInformation)

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

Table 4-27. Attribute SwMajorVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	1
Invalid	Range <div> <div>>=1</div> <div><=1</div> </div>

4.3.18.6 SwMinorVersion (CommonPublishedInformation)

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

Table 4-28. Attribute SwMinorVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	0
Invalid	Range <div> <div>>=0</div> <div><=0</div> </div>

4.3.18.7 SwPatchVersion (CommonPublishedInformation)

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

Table 4-29. Attribute SwPatchVersion (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	1
Invalid	Range >=1 <=1

4.3.18.8 VendorApiInfix (CommonPublishedInformation)

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><Api name from SWS>. E.g. assuming that the VendorId of the implementor is 123 and the implementer chose a VendorApiInfix of "v11r456" a api name Adc_Init defined in the SWS will translate to Adc_123_v11r456Init. This parameter is mandatory for all modules with upper multiplicity > 1. It shall not be used for modules with upper multiplicity =1.

Table 4-30. Attribute VendorApiInfix (CommonPublishedInformation) detailed description

Property	Value
Type	STRING_LABEL
Origin	NXP
Symbolic Name	false
Default	
Enable	false

4.3.18.9 VendorId (CommonPublishedInformation)

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

Table 4-31. Attribute VendorId (CommonPublishedInformation) detailed description

Property	Value
Type	INTEGER_LABEL
Origin	NXP
Symbolic Name	false
Default	43
Invalid	Range >=43 <=43

4.3.19 Form NonAutosar

Non Autosar API settings.

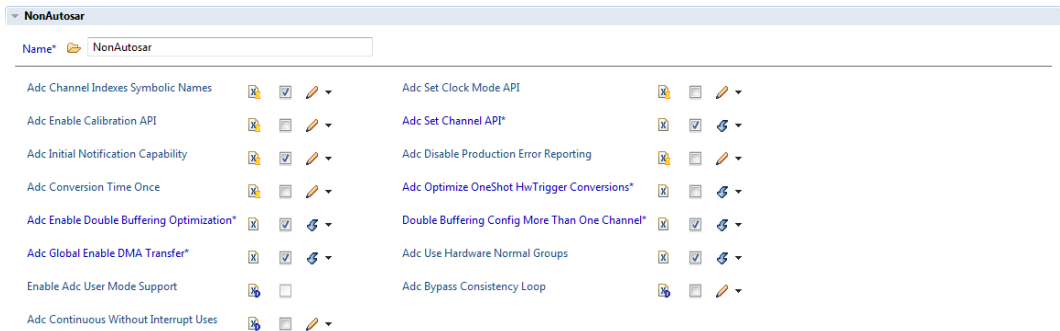


Figure 4-5. Tresos Plugin snapshot for NonAutosar form.

4.3.19.1 AdcEnableGroupDependentChannelNames (NonAutosar)

Note

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.

Table 4-32. Attribute AdcEnableGroupDependentChannelNames (NonAutosar) detailed description

Property	Value
Label	Adc Channel Indexes Symbolic Names
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.2 AdcEnableCalibration (NonAutosar)

Note

If this parameter has been configured to "TRUE", the Non-Autosar function "Adc_Calibrate()" shall be accessible, otherwise this function shall be removed from the code. This functionality is not available for this platform (not supported by HW).

This is an Implementation Specific Parameter.

Table 4-33. Attribute AdcEnableCalibration (NonAutosar) detailed description

Property	Value
Label	Adc Enable Calibration API
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false
Enable	false

4.3.19.3 AdcEnableInitialNotification (NonAutosar)

Note

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

Note This 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 HW configuration for the next conversion.

Table 4-34. Attribute AdcEnableInitialNotification (NonAutosar) detailed description

Property	Value
Label	Adc Initial Notification Capability
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.4 AdcConvTimeOnce (NonAutosar)

Note

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.

Table 4-35. AdcConvTimeOnce. (NonAutosar) detailed description

Property	Value
Label	Adc Conversion Time Once
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.5 AdcEnableDoubleBufferingOptimization (NonAutosar)

Note

Implementation Specific Parameter. Enable/Disable The Adc driver double buffering optimization for HW Triggered groups, OneShot, Streamin access, Circular Buffer. Also, all groups that enable this feature must have at only 1 channels configured.

Table 4-36. Attribute AdcEnableDoubleBufferingOptimization (NonAutosar) detailed description

Property	Value
Label	Adc Enable Double Buffering Optimization
Type	BOOLEAN
Origin	NXP

Table continues on the next page...

Table 4-36. Attribute AdcEnableDoubleBufferingOptimization (NonAutosar) detailed description (continued)

Property	Value
Symbolic Name	false
Default	false

4.3.19.6 AdcEnableDualClockMode (NonAutosar)

Note

Adds/removes the Dual Clock mode service Adc_SetClockMode from the code. Also it enables the programming of Conversion Timing registers in Adc_SetClockMode.

Table 4-37. AdcEnableDualClockMode. (NonAutosar) detailed description

Property	Value
Label	Adc Set Clock Mode API
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false
Enable	false

4.3.19.7 AdcEnableSetChannel (NonAutosar)

Note

If this parameter has been configured to "TRUE", the Non-Autosar function "Adc_SetChannel()" shall be accessible, otherwise this function shall be removed from the code. This is an Implementation Specific Parameter.

Table 4-38. Attribute AdcEnableSetChannel (NonAutosar) detailed description

Property	Value
Label	Adc Set Channel API
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.8 AdcDisableDemReportErrorStatus (NonAutosar)

Note

Enable/Disable Dem error reporting.

Table 4-39. AdcDisableDemReportErrorStatus. (NonAutosar) detailed description

Property	Value
Label	Adc Disable Production Error Reporting
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false
Enable	false

4.3.19.9 AdcOptimizeOneShotHwTriggerConversions (NonAutosar)

Note

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 at most 8 channels configured.

Table 4-40. AdcOptimizeOneShotHwTriggerConversions. (NonAutosar) detailed description

Property	Value
Label	Adc Optimize OneShot HwTrigger Conversions
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.10 AdcEnableDmaTrasferMode (NonAutosar)

Note

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 configured for any Adc unit in any variant. If this parameter is enabled then the DMA configuration code will not be removed. This is an Implementation Specific Parameter.

Table 4-41. AdcEnableDmaTransferMode. (NonAutosar) detailed description

Property	Value
Label	Adc Global Enable DMA Transfer
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.11 AdcEnableUserModeSupport (NonAutosar)

Note

When this parameter is enabled, the Adc module will adapt to run from User Mode. Note: No special measures need to be taken to run ADC driver from user mode; The Adc driver code can be executed at any time from both supervisor and user mode.

Table 4-42. AdcEnableUserModeSupport. (NonAutosar) detailed description

Property	Value
Label	Enable Adc User Mode Support
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.12 AdcContinuousWithoutInterrupt (NonAutosar)

Note

This parameter globally enables the possibility to configure continuous without interrupt. This is an Implementation Specific Parameter.

Table 4-43. AdcContinuousWithoutInterrupt. (NonAutosar) detailed description

Property	Value
Label	Adc Continuous Without Interrupt Uses
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.13 DoubleBufferingMoreThanOneChannel (NonAutosar)

Note

Allow group with double buffering enable config more than one channel.

Table 4-44. DoubleBufferingMoreThanOneChannel. (NonAutosar) detailed description

Property	Value
Label	Double Buffering Config More Than One Channel
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.14 AdcUseHardwareNormalGroups(NonAutosar)

Note

This parameter defines if Hardware Normal Groups are used in any Hardware Unit, any variant. It needs to be enabled if Hardware Normal Groups are needed. If Hardware Normal Groups are not needed, this parameter should be disabled - for code optimizations. This is an Implementation Specific Parameter.

Table 4-45. AdcUseHardwareNormalGroups. (NonAutosar) detailed description

Property	Value
Label	Double Buffering Config More Than One Channel
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.19.15 AdcBypassConsistencyLoop(NonAutosar)

Note

This is used to increase ADC performances. If checking the HW-SW coherency is no longer guaranteed by the driver, the user must make sure he does not call a ADC service before the HW reaches the correct state.

Table 4-46. AdcBypassConsistencyLoop. (NonAutosar) detailed description

Property	Value
Label	Adc Bypass Consistency Loop
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.20 Form AdcDemEventParameterRefs

Container for the references to DemEventParameter elements which shall be invoked using the API Dem_ReportErrorStatus API in case the corresponding error occurs. The EventId is taken from the referenced DemEventParameter's DemEventId value. The standardized errors are provided in the container and can be extended by vendor specific error references.

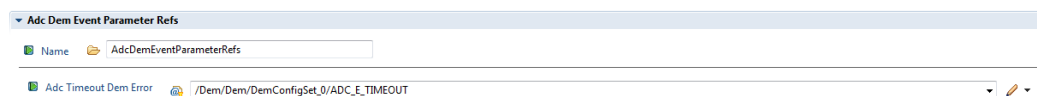


Figure 4-6. Tresos Plugin snapshot for AdcDemEventParameterRefs form.

4.3.20.1 ADC_E_TIMEOUT (AdcDemEventParameterRefs)

Reference to configured DEM event to report "Timeout failure".

Table 4-47. Attribute ADC_E_TIMEOUT (AdcDemEventParameterRefs) detailed description

Property	Value
Label	Adc Timeout Dem Error
Type	SYMBOLIC-NAME-REFERENCE

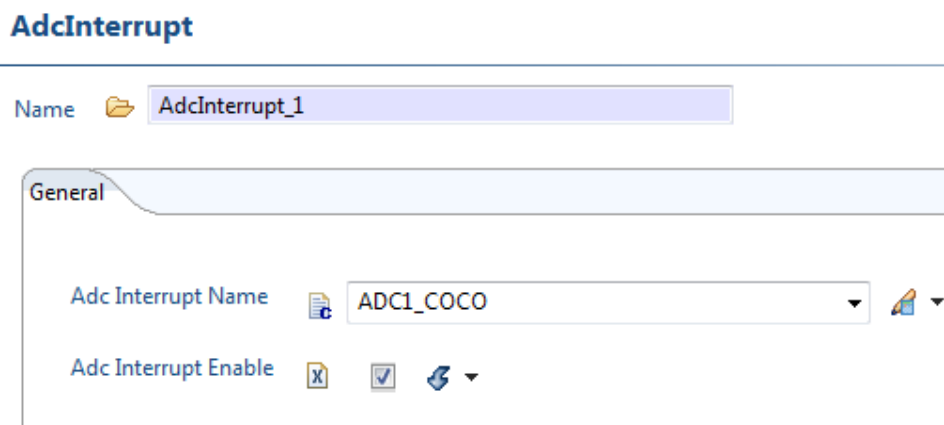
Table continues on the next page...

Table 4-47. Attribute ADC_E_TIMEOUT (AdcDemEventParameterRefs) detailed description (continued)

Property	Value
Origin	NXP
Optional	true

4.3.21 Form AdcInterrupt

Selects whether the interrupt for each ADC Unit will be enabled. For each Adc HW unit, there are 2 interrupts that can be enabled: the End of Conversion and the Watchdog interrupts. These settings are used for optimizing the code size by removing the interrupt handling code for interrupts that are not needed.

**Figure 4-7. Tresos Plugin snapshot for AdcInterrupt form.**

4.3.21.1 AdcInterruptSource (AdcInterrupt)

The name of the interrupt.

- Note: Implementation Specific Parameter.

Table 4-48. Attribute AdcInterruptSource (AdcInterrupt) detailed description

Property	Value
Label	Adc Interrupt Name
Type	STRING
Origin	NXP
Symbolic Name	false

4.3.21.2 AdcInterruptEnable (AdcInterrupt)

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

Table 4-49. Attribute AdcInterruptEnable (AdcInterrupt) detailed description

Property	Value
Label	Adc Interrupt Enable
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22 Form AdcConfigSet

This is the base container that contains the post-build selectable configuration parameters

Included forms :

- [Form AdcGeneric](#)
- [Form AdcHwUnit](#)

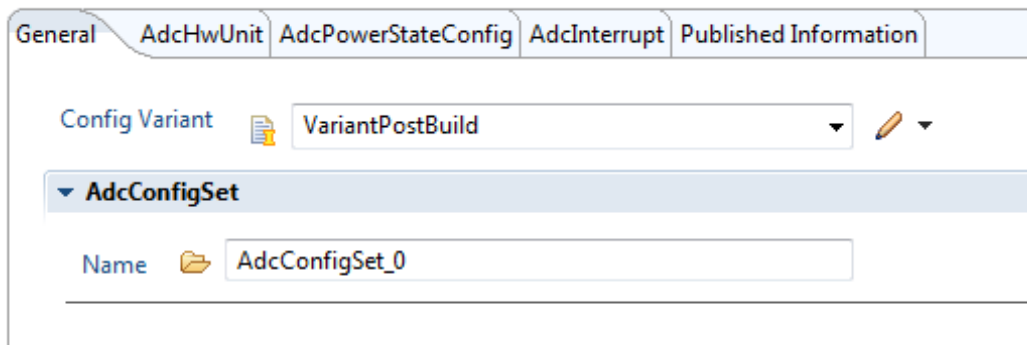


Figure 4-8. Tresos Plugin snapshot for AdcConfigSet form.

4.3.22.1 Form AdcHwUnit

This container contains the Driver configuration (parameters) depending on grouping of channels.

Is included by form : [Form AdcConfigSet](#)

Included forms :

- [Form AdcChannel](#)
- [Form AdcGroup](#)
- [Form AdcPdbSettings](#)
- [Form AdcNormalConversionTimings](#)
- [Form AdcAlternateConversionTimings](#)

AdcHwUnit

Name AdcHwUnit_1

General | AdcChannel | AdcGroup

Adc Transfer Type ADC_INTERRUPT

☒ Adc Source Clock ADC_ALTCLK1

Adc Hardware Unit ADC1

Adc Logical Unit Id 0

Adc Voltage Reference Selection VREFH_VREFL

☒ Adc Prescaler Value (0 -> 65535) 1

Adc Resolution BITS_12

Adc Offset Correction Value (0 -> 255) 0

▶ AdcPdbSettings

▶ AdcNormalConversionTimings

▶ AdcAlternateConversionTimings

Figure 4-9. Tresos Plugin snapshot for AdcHwUnit form.

4.3.22.1.1 AdcTransferType (AdcHwUnit)

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. If DMA is required for AdcTransferType, it is recommended to keep AdcWithoutInterrupts as false, otherwise, DMA will not be configured and it will be user responsibility to read the results from registers directly by calling Adc_ReadGroup

Table 4-50. Attribute AdcTransferType (AdcHwUnit) detailed description

Property	Value
Label	Adc Transfer Type
Type	ENUMERATION
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_INTERRUPT

Table continues on the next page...

Table 4-50. Attribute AdcTransferType (AdcHwUnit) detailed description (continued)

Property	Value
Range	ADC_DMA ADC_INTERRUPT

4.3.22.1.2 AdcClockSource (AdcHwUnit)

Not used. This value should be selected in the MCU Driver.

Table 4-51. Attribute AdcClockSource (AdcHwUnit) detailed description

Property	Value
Label	Adc Source Clock
Type	ENUMERATION
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_ALTCLK1
Enable	false
Range	ADC_ALTCLK1 ADC_ALTCLK2 ADC_ALTCLK3 ADC_ALTCLK4

4.3.22.1.3 AdcHwUnitId (AdcHwUnit)

Specifies the used ADC Hardware Unit.

Table 4-52. Attribute AdcHwUnitId (AdcHwUnit) detailed description

Property	Value
Label	Adc Hardware Unit
Type	ENUMERATION
Origin	AUTOSAR_ECUC
Symbolic Name	false
Range	ADC0 ADC1

4.3.22.1.4 AdcLogicalUnitId (AdcHwUnit)

Specifies the used ADC Hardware Unit.

Table 4-53. Attribute AdcLogicalUnitId (AdcHwUnit) detailed description

Property	Value
Label	Adc Logical Unit Id
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Invalid	<=1 >=0

4.3.22.1.5 AdcVoltageReferenceSelection (AdcHwUnit)

Selects the voltage reference source used for conversions. Refer to the chip configuration chapter's ADC section for details of these field definitions for this chip.

- VREFH_VREFL - Selects VREFH/VREFL as reference voltage.
- VALTH_VALTL - Selects VALTH_VREFL as reference voltage.

Table 4-54. Attribute AdcVoltageReferenceSelection (AdcHwUnit) detailed description

Property	Value
Label	Adc Voltage Reference Selection
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	VREFH_VREFL
Range	VREFH_VREFL VALTH_VREFL

4.3.22.1.6 AdcPrescale (AdcHwUnit)

Not used, use the AdcClockDivideSelect instead.

Table 4-55. Attribute AdcPrescale (AdcHwUnit) detailed description

Property	Value
Label	Adc Prescaler Value
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	2
Invalid	Range <=65535 >=0

4.3.22.1.7 AdcResolution (AdcHwUnit)

Used to set the ADC resolution mode.

- BITS_8 - 8-bit conversion.
- BITS_10 - 10-bit conversion.
- BITS_12 - 12-bit conversion.

Table 4-56. Attribute AdcResolution (AdcHwUnit) detailed description

Property	Value
Label	Adc Resolution
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	BITS_12
Range	BITS_8 BITS_10 BITS_12

4.3.22.1.8 AdcOffsetCorrectionValue (AdcHwUnit)

Value to be written in the ADC_OFS(Offset correction value register). This value will be added with the converted result value to generate final result to be loaded into ADC_Rn.

Table 4-57. Attribute AdcOffsetCorrectionValue (AdcHwUnit) detailed description

Property	Value
Label	Adc Offset Correction Value
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	0
Range	>=0 <=255

4.3.22.1.9 Form AdcChannel

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

Is included by form : [Form AdcHwUnit](#)

AdcChannel

Name

AdcChannel_0_0

General

Adc Logical Channel ID

0

Adc Hardware Channel Id

AN_0

Adc Channel Limit Check

☐

Adc Channel High Limit

2

Adc Channel Low Limit

1

Adc Channel Range Select

ADC_RANGE_UNDER_LOW

Adc Channel Conversion Time (0 -> 9223372036854775807)

0

Adc High Reference Voltage

UPPER_REF_VOLT_0

Adc Low Reference Voltage

LOWER_REF_VOLT_0

Adc Channel Resolution (1 -> 63)

12

Adc Channel Sampling time (8 -> 254)

8

Figure 4-10. Tresos Plugin snapshot for AdcChannel form.

4.3.22.1.9.1 AdcLogicalChannelId (AdcChannel)

This is the logical Id of the ADC channel.

Table 4-58. Attribute AdcLogicalChannelId (AdcChannel) detailed description

Property	Value
Label	Adc Logical Channel ID
Type	INTEGER
Origin	NXP
Symbolic Name	false
Invalid	Range <=1024 >=0

4.3.22.1.9.2 AdcChannelId (AdcChannel)

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.

Table 4-59. Attribute AdcChannelId (AdcChannel) detailed description

Property	Value
Label	Adc Hardware Channel Id

Table continues on the next page...

Table 4-59. Attribute AdcChannelId (AdcChannel) detailed description (continued)

Property	Value
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false

4.3.22.1.9.3 AdcChannelLimitCheck (AdcChannel)

Enables or disables limit checking for an ADC channel.

Table 4-60. Attribute AdcChannelLimitCheck (AdcChannel) detailed description

Property	Value
Label	Adc Channel Limit Check
Type	BOOLEAN
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	false

4.3.22.1.9.4 AdcChannelHighLimit (AdcChannel)

High limit - used for limit checking.

Table 4-61. Attribute AdcChannelHighLimit (AdcChannel) detailed description

Property	Value
Label	Adc Channel High Limit
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	0
Invalid	Range <=9223372036854775807 >=0

4.3.22.1.9.5 AdcChannelLowLimit (AdcChannel)

Low limit - used for limit checking.

Table 4-62. Attribute AdcChannelLowLimit (AdcChannel) detailed description

Property	Value
Label	Adc Channel Low Limit
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	0
Invalid	Range <=9223372036854775807 >=0

4.3.22.1.9.6 AdcChannelRangeSelect (AdcChannel)

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

Table 4-63. Attribute AdcChannelRangeSelect (AdcChannel) detailed description

Property	Value
Label	Adc Channel Range Select
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_RANGE_ALWAYS
Range	ADC_RANGE_ALWAYS ADC_RANGE_BETWEEN ADC_RANGE_NOT_BETWEEN ADC_RANGE_NOT_OVER_HIGH ADC_RANGE_NOT_UNDER_LOW ADC_RANGE_OVER_HIGH ADC_RANGE_UNDER_LOW

4.3.22.1.9.7 AdcChannelConvTime (AdcChannel)

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.

This parameter is not used by the current implementation.

Table 4-64. Attribute AdcChannelConvTime (AdcChannel) detailed description

Property	Value
Label	Adc Channel Conversion Time

Table continues on the next page...

Table 4-64. Attribute AdcChannelConvTime (AdcChannel) detailed description (continued)

Property	Value
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	0
Enable	false
Invalid	Range <=9223372036854775807 >=0

4.3.22.1.9.8 AdcChannelRefVoltsrcHigh (AdcChannel)

Upper reference voltage source for each channel. This parameter is not used by the current implementation.

Table 4-65. Attribute AdcChannelRefVoltsrcHigh (AdcChannel) detailed description

Property	Value
Label	Adc High Reference Voltage
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	UPPER_REF_VOLT_0
Enable	false
Range	UPPER_REF_VOLT_0

4.3.22.1.9.9 AdcChannelRefVoltsrcLow (AdcChannel)

Lower reference voltage source for each channel. This parameter is not used by the current implementation.

Table 4-66. Attribute AdcChannelRefVoltsrcLow (AdcChannel) detailed description

Property	Value
Label	Adc Low Reference Voltage
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	LOWER_REF_VOLT_0
Enable	false
Range	LOWER_REF_VOLT_0

4.3.22.1.9.10 AdcChannelResolution (AdcChannel)

Channel Resolution in bits of converted value. It's fixed to 12 bits.

Table 4-67. Attribute AdcChannelResolution (AdcChannel) detailed description

Property	Value
Label	Adc Channel Resolution
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	12
Invalid	Range <div><=63</div> <div>>=1</div>

4.3.22.1.9.11 AdcChannelSampTime (AdcChannel)

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

Table 4-68. Attribute AdcChannelSampTime (AdcChannel) detailed description

Property	Value
Label	Adc Channel Sampling time
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	8
Enable	false
Invalid	Range <div>>=8</div> <div><=254</div>

4.3.22.1.10 Form AdcGroup

This container contains the Group configuration (parameters).

Is included by form : [Form AdcHwUnit](#)

Included forms :

- [Form AdcGroupNormalConversionTimings](#)
- [Form AdcGroupDefinition](#)

- Form `AdcChannelDelay`

The screenshot shows the 'AdcChannelDelay' configuration tab for 'AdcGroup_12'. The parameters and their values are as follows:

- Adc Group Access Mode: `ADC_ACCESS_MODE_STREAMING`
- Adc Group Conversion Mode: `ADC_CONV_MODE_ONESHOT`
- Adc Group Conversion Type: `ADC_CONV_TYPE_NORMAL`
- Adc Group Id: 12
- Adc Group Priority: 255
- Adc Group Replacement: `ADC_GROUP_REPL_ABORT_RESTART`
- Adc Group Trigger Source: `ADC_TRIGG_SRC_HW`
- Adc Group Trigger Signal: `ADC_HW_TRIG_RISING_EDGE`
- Adc Group Trigger Timer (0 -> 4294967295): 50
- Adc Group Notification: Notification_12
- Adc Group Extra Notification: NULL_PTR
- Adc Group Streaming Buffer Mode: `ADC_STREAM_BUFFER_CIRCULAR`
- Adc Group Enable Double Buffering: ☐
- Adc Group Streaming Number Samples: 10
- Adc Group Without Interrupts: ☐
- Adc Group Uses Channel Delays: ☐
- Adc Delay Next PDB (0 -> 65535): 0
- Adc Pdb Period For Continuous Mode (0 -> 65535): 0

Figure 4-11. Tresos Plugin snapshot for AdcGroup form.

4.3.22.1.10.1 `AdcGroupAccessMode (AdcGroup)`

Type of access mode to group conversion results.

Table 4-69. Attribute `AdcGroupAccessMode (AdcGroup)` detailed description

Property	Value
Label	Adc Group Access Mode
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	<code>ADC_ACCESS_MODE_SINGLE</code>
Range	<code>ADC_ACCESS_MODE_SINGLE</code> <code>ADC_ACCESS_MODE_STREAMING</code>

4.3.22.1.10.2 `AdcGroupConversionMode (AdcGroup)`

Type of Conversion mode of the channel group.

Table 4-70. Attribute AdcGroupConversionMode (AdcGroup) detailed description

Property	Value
Label	Adc Group Conversion Mode
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_CONV_MODE_ONESHOT
Range	ADC_CONV_MODE_CONTINUOUS ADC_CONV_MODE_ONESHOT

4.3.22.1.10.3 AdcGroupConversionType (AdcGroup)

Normal or Injected conversion type.

Table 4-71. Attribute AdcGroupConversionType (AdcGroup) detailed description

Property	Value
Label	Adc Group Conversion Type
Type	STRING
Origin	NXP
Symbolic Name	false
Default	ADC_CONV_TYPE_NORMAL
Range	ADC_CONV_TYPE_NORMAL ADC_CONV_TYPE_INJECTED

4.3.22.1.10.4 AdcGroupId (AdcGroup)

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.

Table 4-72. Attribute AdcGroupId (AdcGroup) detailed description

Property	Value
Label	Adc Group Id
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	true
Invalid	Range ≤1023 ≥0

4.3.22.1.10.5 AdcGroupPriority (AdcGroup)

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

Table 4-73. Attribute AdcGroupPriority (AdcGroup) detailed description

Property	Value
Label	Adc Group Priority
Optional	true
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	0
Invalid	Range <=255 >=0

4.3.22.1.10.6 AdcGroupReplacement (AdcGroup)

Replacement mechanism used on ADC group level, if a group conversion is interrupted by a group which has a higher priority. It's fixed to Abort/Restart

Table 4-74. Attribute AdcGroupReplacement (AdcGroup) detailed description

Property	Value
Label	Adc Group Replacement
Optional	true
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_GROUP_REPL_ABORT_RESTART
Enable	false
Range	ADC_GROUP_REPL_ABORT_RESTART ADC_GROUP_REPL_SUSPEND_RESUME

4.3.22.1.10.7 AdcGroupTriggSrc (AdcGroup)

Type of source event that starts a group conversion. It's possible to select Hw or Sw trigger. In case of HW trigger source the actual HW trigger source will be selected by the "AdcHwTriggSrc" parameter and it can be any of the supported HW trigger sources available for this controller.

Table 4-75. Attribute AdcGroupTriggSrc (AdcGroup) detailed description

Property	Value
Label	Adc Group Trigger Source
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_TRIGG_SRC_SW
Range	ADC_TRIGG_SRC_HW ADC_TRIGG_SRC_SW

4.3.22.1.10.8 AdcHwTrigSignal (AdcGroup)

Configures on which edge of the hardware trigger signal the driver should reach, i.e. start the conversion.

Table 4-76. Attribute AdcHwTrigSignal (AdcGroup) detailed description

Property	Value
Label	Adc Group Trigger Signal
Optional	true
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_HW_TRIG_RISING_EDGE
Range	ADC_HW_TRIG_FALLING_EDGE ADC_HW_TRIG_RISING_EDGE

4.3.22.1.10.9 AdcHwTrigTimer (AdcGroup)

Reload value of the ADC module embedded timer. Isn't used on this version.

Table 4-77. Attribute AdcHwTrigTimer (AdcGroup) detailed description

Property	Value
Label	Adc Group Trigger Timer
Optional	true
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	0
Enable	false
Invalid	Range

Table 4-77. Attribute AdcHwTrigTimer (AdcGroup) detailed description

Property	Value
	≤ 4294967295 ≥ 0

4.3.22.1.10.10 AdcNotification (AdcGroup)

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

Table 4-78. Attribute AdcNotification (AdcGroup) detailed description

Property	Value
Label	Adc Group Notification
Optional	true
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	NULL_PTR

4.3.22.1.10.11 AdcExtraNotification (AdcGroup)

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.

Table 4-79. Attribute AdcExtraNotification (AdcGroup) detailed description

Property	Value
Label	Adc Group Extra Notification
Optional	true
Type	STRING
Origin	NXP
Symbolic Name	false
Default	NULL_PTR

4.3.22.1.10.12 AdcStreamingBufferMode (AdcGroup)

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 ring buffer (wraps around if the end of the stream buffer is reached).

Table 4-80. Attribute AdcStreamingBufferMode (AdcGroup) detailed description

Property	Value
Label	Adc Group Streaming Buffer Mode
Type	STRING
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	ADC_STREAM_BUFFER_LINEAR
Range	ADC_STREAM_BUFFER_CIRCULAR ADC_STREAM_BUFFER_LINEAR

4.3.22.1.10.13 AdcEnableDoubleBuffering (AdcGroup)

Enable/ Disable the Double Buffering feature for Adc group conversions. this Parameter can be configured only for groups configured with ADC_ACCESS_MODE_STREAMING Access Mode, and only if ADC_DMA is configured as the transfer method for the Adc Unit. When this parameter is Disabled, normal functionality shall be executed. Note: This is an Implementation Specific Parameter.

Table 4-81. Attribute AdcEnableDoubleBuffering (AdcGroup) detailed description

Property	Value
Label	Adc Group Enable Double Buffering
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false
Readonly	false

4.3.22.1.10.14 AdcEnableHafInterrupt (AdcGroup)

Enable/ Disable the interrupt when haf1 sample complete for double buffering feature. Double buffering must be enable for configure this feature.

Table 4-82. Attribute AdcEnableHafInterrupt (AdcGroup) detailed description

Property	Value
Label	Adc Group Enable Haf1 Interrupt
Type	BOOLEAN
Origin	NXP
Symbolic Name	false

Table continues on the next page...

Table 4-82. Attribute AdcEnableHafInterrupt (AdcGroup) detailed description (continued)

Property	Value
Default	false
Readonly	false

4.3.22.1.10.15 AdcStreamingNumSamples (AdcGroup)

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

Table 4-83. Attribute AdcStreamingNumSamples (AdcGroup) detailed description

Property	Value
Label	Adc Group Streaming Number Samples
Type	INTEGER
Origin	AUTOSAR_ECUC
Symbolic Name	false
Default	1
Invalid	Range <=1024 >=1

4.3.22.1.10.16 AdcWithoutInterrupts (AdcGroup)

Enable/ Disable the occurring of ADC Interrupts and Reading of the group conversion results periodically without interrupts. A) When this parameter is enabled, interrupts are disabled . The conversion will run without software intervention (no interrupt generated anymore) and application can read the results only by calling Adc_ReadGroup(). B) When this parameter is enabled, the result buffer is no longer to be used to read the results as the results will be directly read from HW registers. C) data transfer using DMA cannot be used when this parameter is enabled When this parameter is Disabled, normal functionlaity shall be executed. Note: This is an Implementation Specific Parameter.

Table 4-84. Attribute AdcWithoutInterrupts (AdcGroup) detailed description

Property	Value
Label	Adc Group Without Interrupts
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.10.17 AdcGroupInBacktoBackMode (AdcGroup)

Enable/ Disable the channel conversions occurring in Back to Back mode. When this feature is enabled, PDB_CH1n_C1[BB] bits will be set for the group channels, from the second to the last. The first channel conversion complete will trigger the PDB channel second pretrigger, and so on until the last channel of the group. This ensures that the channel conversions occur in sequence. If this feature is not enabled for a group, all pretriggers of the PDB channel will be triggered at the same time. The coherence of channel conversions must be ensured via the delay configured for each pretrigger. If AdcGroupUsesChannelDelays is also configured for this group, the user can configure a delay for the first channel conversion, the rest will be converted in back to back mode (no delays).

Table 4-85. Attribute AdcGroupInBacktoBackMode (AdcGroup) detailed description

Property	Value
Label	Adc Group In Back to Back Mode
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.10.18 AdcGroupUsesChannelDelays (AdcGroup)

Enable/ Disable the usage of channel delays. When this feature is enabled, PDB_CH1nDLYx will be set with the values configured in AdcChannelDelay list for each channel. If AdcGroupInBacktoBackMode is set, the group conversions will work even without using channel delays.

Table 4-86. Attribute AdcGroupUsesChannelDelays (AdcGroup) detailed description

Property	Value
Label	Adc Group Uses Channel Delays
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.10.19 AdcDelayNextPdb (AdcGroup)

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)`.

Table 4-87. Attribute `AdcDelayNextPdb (AdcGroup)` detailed description

Property	Value
Label	Adc Delay Next PDB
Optional	true
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	0
Enable	false
Invalid	Range <div><=65535</div> <div>>=0</div>

4.3.22.1.10.20 `AdcPdbPeriodContinuousMode (AdcGroup)`

The period of PDB 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 conversion before PDB restarts.

Table 4-88. Attribute `AdcPdbPeriodContinuousMode (AdcGroup)` detailed description

Property	Value
Label	Adc Pdb Period For Continous Mode
Optional	true
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	0
Enable	false
Invalid	Range <div><=65535</div> <div>>=0</div>

4.3.22.1.11 Form AdcGroupNormalConversionTimings

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

Is included by form : [Form AdcGroup](#)

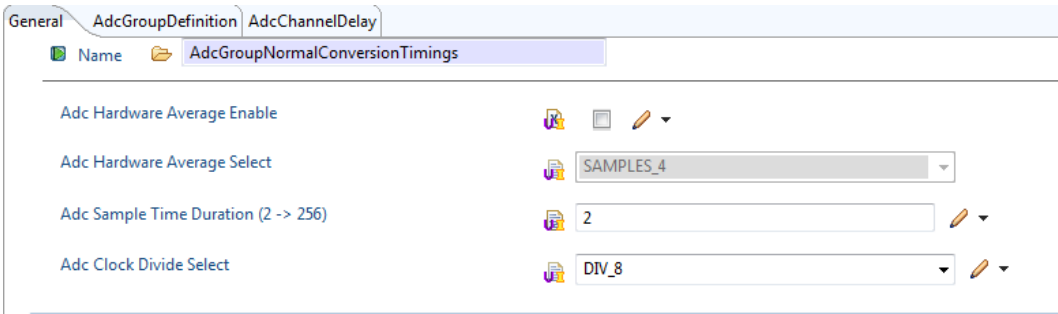


Figure 4-12. Tresos Plugin snapshot for AdcGroupNormalConversionTimings form.

4.3.22.1.11.1 AdcGroupHardwareAverageEnable (AdcGroupNormalConversionTimings)

Enables the hardware average function of the ADC.

Table 4-89. Attribute AdcGroupHardwareAverageEnable (AdcGroupNormalConversionTimings) detailed description

Property	Value
Label	Adc Hardware Average Enable
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.11.2 AdcGroupHardwareAverageSelect (AdcGroupNormalConversionTimings)

Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADCx_SC3[AVGE] = 1.

- SAMPLES_4 - 4 samples averaged.
- SAMPLES_8 - 8 samples averaged.
- SAMPLES_16 - 16 samples averaged.
- SAMPLES_32 - 32 samples averaged.

**Table 4-90. Attribute AdcGroupHardwareAverageSelect
(AdcGroupNormalConversionTimings) detailed description**

Property	Value
Label	Adc Hardware Average Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	SAMPLES_4
Range	SAMPLES_4 SAMPLES_8 SAMPLES_16 SAMPLES_32

4.3.22.1.11.3 AdcGroupSampleTimeDuration (AdcGroupNormalConversionTimings)

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

**Table 4-91. Attribute AdcGroupSampleTimeDuration
(AdcGroupNormalConversionTimings) detailed description**

Property	Value
Label	Adc Sample Time Duration
Type	INTEGER
Origin	Freescale
Symbolic Name	false
Default	2
Invalid	Range <=256 >=2

4.3.22.1.11.4 AdcGroupClockDivideSelect (AdcGroupNormalConversionTimings)

Selects the divide ratio used by the ADC to generate the internal clock ADCK.

- DIV_NONE - Input clock
- DIV_2 - Input clock / 2
- DIV_4 - Input clock / 4
- DIV_8 - Input clock / 8

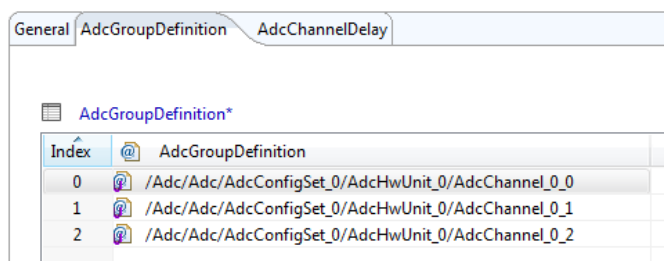
Table 4-92. Attribute AdcGroupClockDivideSelect (AdcGroupNormalConversionTimings) detailed description

Property	Value
Label	Adc Clock Divide Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	DIV_NONE
Range	DIV_NONE DIV_2 DIV_4 DIV_8

4.3.22.1.12 Form AdcGroupDefinition

Is included by form : [Form AdcGroup](#)

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

**Figure 4-13. Tresos Plugin snapshot for AdcGroupDefinition form.****Table 4-93. Attribute AdcGroupDefinition (AdcGroupDefinition) detailed description**

Property	Value
Type	REFERENCE
Origin	AUTOSAR_ECUC

4.3.22.1.13 Form AdcChannelDelay

Is included by form : [Form AdcGroup](#)

Index	Adc Cha...
0	50
1	100
2	150
3	200
4	250

Figure 4-14. Tresos Plugin snapshot for AdcChannelDelay form.

Table 4-94. Attribute AdcChannelDelay (AdcChannelDelay) detailed description

Property	Value
Type	INTEGER
Origin	NXP
Label	Adc Channel Delay
Default	50
Invalid	Range <div> <div><=65535</div> <div>>=1</div> </div>

4.3.22.1.14 Form AdcPdbSettings

Configuration for the PDB unit associated with this Adc hardware unit.

Is included by form : [Form AdcHwUnit](#)

AdcPdbSettings

Name AdcPdbSettings

Adc Pdb Prescaler Divider Select (0 -> 7) 0

Adc Pdb Multiplication Factor Select for Prescaler (0 -> 3) 0

PDB Sequence Error Interrupt Enable ☒

PDB Sequence Error Notification NULL_PTR

Figure 4-15. Tresos Plugin snapshot for AdcPdbSettings form.

4.3.22.1.14.1 AdcPdbPrescalerDividerSelect (AdcPdbSettings)

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.

Table 4-95. Attribute AdcPdbPrescalerDividerSelect (AdcPdbSettings) detailed description

Property	Value
Label	Adc Pdb Prescaler Divider Select
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	0
Invalid	Range <div style="margin-left: 20px;"> ≤ 7 ≥ 0 </div>

4.3.22.1.14.2 AdcPdbMultiplicationFactorSelect (AdcPdbSettings)

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.

Table 4-96. Attribute AdcPdbMultiplicationFactorSelect (AdcPdbSettings) detailed description

Property	Value
Label	Adc Pdb Multiplication Factor Select for Prescaler
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	0
Invalid	Range <div> <div><=3</div> <div>>=0</div> </div>

4.3.22.1.14.3 AdcPdbChannelSequenceErrorEnable (AdcPdbSettings)

Enables the PDB sequence error interrupt. When this field is set, any of the PDB channel sequence error flags generates a PDB sequence error interrupt.

Table 4-97. Attribute AdcPdbChannelSequenceErrorEnable (AdcPdbSettings) detailed description

Property	Value
Label	PDB Sequence Error Interrupt Enable
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.14.4 AdcPdbErrorNotification (AdcPdbSettings)

Callback function for PDB channel sequence error. This function pointer is called everytime when PDB channel sequence error occurred.

Table 4-98. Attribute AdcPdbErrorNotification (AdcPdbSettings) detailed description

Property	Value
Label	PDB Sequence Error Notification
Type	STRING
Origin	NXP
Symbolic Name	false
Default	NULL_PTR

4.3.22.1.15 Form AdcNormalConversionTimings

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

Is included by form : [Form AdcHwUnit](#)

Figure 4-16. TresoS Plugin snapshot for AdcNormalConversionTimings form.

4.3.22.1.15.1 AdcGroupHardwareAverageEnable (AdcNormalConversionTimings)

Enables the hardware average function of the ADC.

Table 4-99. Attribute AdcGroupHardwareAverageEnable (AdcNormalConversionTimings) detailed description

Property	Value
Label	Adc Hardware Average Enable
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.15.2 AdcGroupHardwareAverageSelect (AdcNormalConversionTimings)

Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADC_CS3[AVGE] = 1.

- SAMPLES_4 - 4 samples averaged.
- SAMPLES_8 - 8 samples averaged.
- SAMPLES_16 - 16 samples averaged.
- SAMPLES_32 - 32 samples averaged.

Table 4-100. Attribute AdcGroupHardwareAverageSelect (AdcNormalConversionTimings) detailed description

Property	Value
Label	Adc Hardware Average Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	SAMPLES_4
Range SAMPLES_4 SAMPLES_8 SAMPLES_16 SAMPLES_32	

4.3.22.1.15.3 AdcGroupSampleTimeDuration (AdcNormalConversionTimings)

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

Table 4-101. Attribute AdcGroupSampleTimeDuration (AdcNormalConversionTimings) detailed description

Property	Value
Label	Adc Sample Time Duration
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	2
Invalid	Range ≤256 ≥2

4.3.22.1.15.4 AdcGroupClockDivideSelect (AdcNormalConversionTimings)

Selects the divide ratio used by the ADC to generate the internal clock ADCK.

- DIV_NONE - Input clock
- DIV_2 - Input clock / 2
- DIV_4 - Input clock / 4
- DIV_8 - Input clock / 8

Table 4-102. Attribute AdcGroupClockDivideSelect (AdcNormalConversionTimings) detailed description

Property	Value
Label	Adc Clock Divide Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	DIV_NONE
Range	DIV_NONE DIV_2 DIV_4 DIV_8

4.3.22.1.16 Form AdcAlternateConversionTimings

Selects Alternate values used for programming clock frequency, conversion timing and hardware averaging used by Adc_SetClockMode API when it is called with parameter ADC_ALTERNATE. This is available when AdcEnableDualClockMode is enabled.

Is included by form : [Form AdcHwUnit](#)

Figure 4-17. TresoS Plugin snapshot for AdcAlternateConversionTimings form.

4.3.22.1.16.1 AdcHardwareAverageEnableAlternate (AdcAlternateConversionTimings)

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

Table 4-103. Attribute AdcHardwareAverageEnableAlternate (AdcAlternateConversionTimings) detailed description

Property	Value
Label	Adc Hardware Average Enable
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.3.22.1.16.2 AdcHardwareAverageSelectAlternate (AdcAlternateConversionTimings)

Determines how many ADC conversions will be averaged to create the ADC average result. This functionality is activated when ADC_CS3[AVGE] = 1.

- SAMPLES_4 - 4 samples averaged.
- SAMPLES_8 - 8 samples averaged.
- SAMPLES_16 - 16 samples averaged.
- SAMPLES_32 - 32 samples averaged.

Table 4-104. Attribute AdcHardwareAverageSelectAlternate (AdcAlternateConversionTimings) detailed description

Property	Value
Label	Adc Hardware Average Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	SAMPLES_4
Range	SAMPLES_4 SAMPLES_8 SAMPLES_16 SAMPLES_32

4.3.22.1.16.3 AdcSampleTimeDurationAlternate (AdcAlternateConversionTimings)

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

Table 4-105. Attribute AdcSampleTimeDurationAlternate (AdcAlternateConversionTimings) detailed description

Property	Value
Label	Adc Sample Time Duration
Type	INTEGER
Origin	NXP
Symbolic Name	false
Default	2
Invalid	Range <div><=256</div> <div>>=2</div>

4.3.22.1.16.4 AdcClockDivideSelectAlternate (AdcAlternateConversionTimings)

Selects the divide ratio used by the ADC to generate the internal clock ADCK.

- DIV_NONE - Input clock
- DIV_2 - Input clock / 2
- DIV_4 - Input clock / 4
- DIV_8 - Input clock /8

Table 4-106. Attribute AdcClockDivideSelectAlternate (AdcAlternateConversionTimings) detailed description

Property	Value
Label	Adc Clock Divide Select
Type	STRING
Origin	NXP
Symbolic Name	false
Default	DIV_NONE
Range	<div>DIV_NONE</div> <div>DIV_2</div> <div>DIV_4</div> <div>DIV_8</div>

4.4 Configuration element of Mcl (a dependent module)

Included form :

- TriggerMux

Table 4-107. Revision table

Revision	Date
4.3.0	2011-11-24T17:00:00+01:00

4.5 Form MclTriggerMux

Configuration of TriggerMux which refer to Adc.

TriggerMux	
Name	Value
TrgMux ADC_0 Input0	PDB0_CH0
TrgMux ADC_0 Input1	INPUT_DISABLED
TrgMux ADC_0 Input2	INPUT_DISABLED
TrgMux ADC_0 Input3	INPUT_DISABLED
TrgMux ADC_1 Lock Enabled	<input type="checkbox"/>
TrgMux ADC_1 Input0	PDB1_CH0
TrgMux ADC_1 Input1	INPUT_DISABLED
TrgMux ADC_1 Input2	INPUT_DISABLED
TrgMux ADC_1 Input3	INPUT_DISABLED
TrgMux ADC_1 Lock Enabled	<input type="checkbox"/>
TrgMux PDB0 Input0	LPIT_CH0
TrgMux PDB0 Lock Enabled	<input type="checkbox"/>
TrgMux PDB1 Input0	LPIT_CH0
TrgMux PDB1 Lock Enabled	<input type="checkbox"/>
TrgMux FLEXIO Input0	INPUT_DISABLED

Figure 4-18. Tresos Plugin snapshot for MclTriggerMux form (which refer to Adc)

4.5.1 TrgMux ADC_0 Input0

Used to configure the Adc0 input 0.

Table 4-108. Attribute TrgMuxAdc0Input0 detailed description

Property	Value
Label	TrgMux ADC_0 Input0
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.2 TrgMux ADC_0 Input1

Used to configure the Adc0 input 1.

Table 4-109. Attribute TrgMuxAdc0Input1 detailed description

Property	Value
Label	TrgMux ADC_0 Input1
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.3 TrgMux ADC_0 Input2

Used to configure the Adc0 input 2.

Table 4-110. Attribute TrgMuxAdc0Input2 detailed description

Property	Value
Label	TrgMux ADC_0 Input2
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.4 TrgMux ADC_0 Input3

Used to configure the Adc0 input 3.

Table 4-111. Attribute TrgMuxAdc0Input3 detailed description

Property	Value
Label	TrgMux ADC_0 Input3
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.5 TrgMux ADC_0 Lock Enabled

Configures if register Adc0 must be locked(read-only).

Table 4-112. Attribute TrgMuxAdc0LockEn detailed description

Property	Value
Label	TrgMux ADC_0 Lock Enabled
Type	BOOLEAN
Origin	NXP
Default	false

4.5.6 TrgMux ADC_1 Input0

Used to configure the Adc1 input 0.

Table 4-113. Attribute TrgMuxAdc1Input0 detailed description

Property	Value
Label	TrgMux ADC_1 Input0
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.7 TrgMux ADC_1 Input1

Used to configure the Adc1 input 1.

Table 4-114. Attribute TrgMuxAdc1Input1 detailed description

Property	Value
Label	TrgMux ADC_1 Input1
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.8 TrgMux ADC_1 Input2

Used to configure the Adc1 input 2.

Table 4-115. Attribute TrgMuxAdc1Input2 detailed description

Property	Value
Label	TrgMux ADC_1 Input2
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.9 TrgMux ADC_1 Input3

Used to configure the Adc1 input 3.

Table 4-116. Attribute TrgMuxAdc1Input3 detailed description

Property	Value
Label	TrgMux ADC_1 Input3
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.10 TrgMux ADC_1 Lock Enabled

Configures if register Adc1 must be locked(read-only).

Table 4-117. Attribute TrgMuxAdc1LockEn detailed description

Property	Value
Label	TrgMux ADC_1 Lock Enabled
Type	BOOLEAN
Origin	NXP
Default	false

4.5.11 TrgMux PDB0 Input0

Used to configure the Pdb0 input 0.

Table 4-118. Attribute TrgMuxPdb0Input0 detailed description

Property	Value
Label	TrgMux PDB0 Input0
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.12 TrgMux PDB0 Lock Enabled

Configures if register Pdb0 must be locked(read-only).

Table 4-119. Attribute TrgMuxPdb0LockEn detailed description

Property	Value
Label	TrgMux PDB0 Lock Enabled
Type	BOOLEAN
Origin	NXP
Default	false

4.5.13 TrgMux PDB1 Input0

Used to configure the Pdb1 input 0.

Table 4-120. Attribute TrgMuxPdb1Input0 detailed description

Property	Value
Label	TrgMux PDB1 Input0
Type	STRING
Origin	NXP
Default	INPUT_DISABLED

4.5.14 TrgMux PDB1 Lock Enabled

Configures if register Pdb1 must be locked(read-only).

Table 4-121. Attribute TrgMuxPdb1LockEn detailed description

Property	Value
Label	TrgMux PDB1 Lock Enabled
Type	BOOLEAN
Origin	NXP
Default	false

4.6 Configuration element of Mcu (a dependent module)

Included form :

- McuSIMConfig
- McuSIMClockConfig

Table 4-122. Revision table

Revision	Date
4.3.0	2011-11-24T17:00:00+01:00

4.7 Form McuSIMConfig

Configures SIM_ADCOPT, SIM_CHIPCTL, SIM_FCFG1, SIM_FTMOPT0, SIM_FTMOPT1 and SIM_MISCTRL registers.

Note: Implementation specific Container.

Included forms :

- [Form McuChipControlConfiguration](#)
- [Form McuAdcOptionsConfiguration](#)



Figure 4-19. TresoS Plugin snapshot for McuSIMConfig form.

4.7.1 Form McuChipControlConfiguration

This container contains the configuration for the SIM_CHIPCTL register.

Is included by form : [Form McuSIMConfig](#)

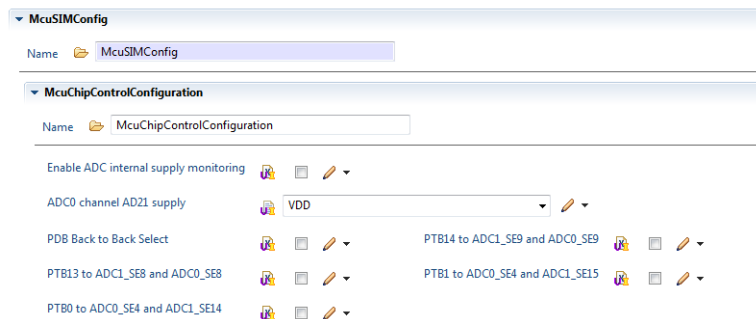


Figure 4-20. TresoS Plugin snapshot for McuChipControlConfiguration form.

4.7.1.1 McuEnableAdcSupplyMonitoring (McuChipControlConfiguration)

SIM_CHIPCTL[ADC_SUPPLYEN] - Enable for internal supply monitoring on ADC0 channel AD21.

Table 4-123. Attribute McuEnableAdcSupplyMonitoring (McuChipControlConfiguration) detailed description

Property	Value
Label	Enable ADC internal supply monitoring
Type	BOOLEAN

Table continues on the next page...

Table 4-123. Attribute McuEnableAdcSupplyMonitoring (McuChipControlConfiguration) detailed description (continued)

Property	Value
Origin	NXP
Symbolic Name	false
Default	false

4.7.1.2 McuAdcSupply (McuChipControlConfiguration)

SIM_CHIPCTL[ADC_SUPPLY] - Internal supplies monitored on ADC0 channel AD21.

Table 4-124. Attribute McuAdcSupply (McuChipControlConfiguration) detailed description

Property	Value
Label	ADC0 channel AD21 supply
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	VDD
Range	VDD VDDA VREFH VDD_3V VDD_FLASH_3V VDD_LV

4.7.1.3 McuPDBBackToBackSelect (McuChipControlConfiguration)

SIM_CHIPCTL[PDB_BB_SEL] - PDB back-to-back select Selects ADC COCO source as pdb back-to-back mode. unchecked - PDB0 channel 0 back-to-back operation with ADC0 COCO[7:0]; PDB1 channel 0 back-to-back operation with ADC1 COCO[7:0]; PDB2 channel 0 back-to-back operation with ADC2 COCO[7:0]. checked - Channel 0 of PDB0,PDB1 back-to-back operation with COCO[7:0] of ADC0, ADC1 Note: Implementation Specific Parameter.

Table 4-125. Attribute McuPDBBackToBackSelect (McuChipControlConfiguration) detailed description

Property	Value
Label	PDB Back to Back Select
Type	BOOLEAN

Table continues on the next page...

Table 4-125. Attribute McuPDBBackToBackSelect (McuChipControlConfiguration) detailed description (continued)

Property	Value
Origin	NXP
Symbolic Name	false
Default	false

4.7.1.4 McuPTB14InterleaveChannelSelect (McuChipControlConfiguration)

SIM_CHIPCTL[INTERLEAVE_SEL] - ADC interleave channel select

Table 4-126. Attribute McuPTB14InterleaveChannelSelect (McuChipControlConfiguration) detailed description

Property	Value
Label	PTB14 to ADC1_SE9 and ADC0_SE9
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.7.1.5 McuPTB13InterleaveChannelSelect (McuChipControlConfiguration)

SIM_CHIPCTL[INTERLEAVE_SEL] - ADC interleave channel select

Table 4-127. Attribute McuPTB13InterleaveChannelSelect (McuChipControlConfiguration) detailed description

Property	Value
Label	PTB13 to ADC1_SE8 and ADC0_SE8
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.7.1.6 McuPTB1InterleaveChannelSelect (McuChipControlConfiguration)

SIM_CHIPCTL[INTERLEAVE_SEL] - ADC interleave channel select

Table 4-128. Attribute McuPTB1InterleaveChannelSelect (McuChipControlConfiguration) detailed description

Property	Value
Label	PTB1 to ADC0_SE4 and ADC1_SE15
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.7.1.7 McuPTB0InterleaveChannelSelect (McuChipControlConfiguration)

SIM_CHIPCTL[INTERLEAVE_SEL] - ADC interleave channel select

Table 4-129. Attribute McuPTB0InterleaveChannelSelect (McuChipControlConfiguration) detailed description

Property	Value
Label	PTB0 to ADC0_SE4 and ADC1_SE14
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

4.7.2 Form McuAdcOptionsConfiguration

This container contains the configuration for the SIM_ADCOPT and SIM_MISCTRL registers.

Is included by form : [Form McuSIMConfig](#)

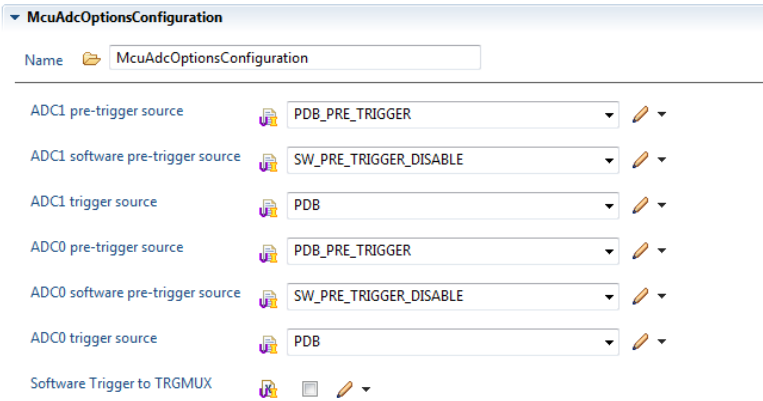


Figure 4-21. Tressos Plugin snapshot for McuAdcOptionsConfiguration form.

4.7.2.1 McuADC1PreTrigeerSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC1PRETRGSE] - ADC1 pre-trigger source select

Table 4-130. Attribute McuADC1PreTrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC1 pre-trigger source
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	PDB_PRE_TRIGGER
Range	PDB_PRE_TRIGGER TRGMUX_PRE_TRIGGER SOFTWARE_PRE_TRIGGER

4.7.2.2 McuADC1SoftwarePreTrigeerSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC1SWPRETRG] - ADC1 software pre-trigger sources

Table 4-131. Attribute McuADC1SoftwarePreTrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC1 software pre-trigger source
Type	ENUMERATION

Table continues on the next page...

Table 4-131. Attribute McuADC1SoftwarePreTrigeeSourceSelect (McuAdcOptionsConfiguration) detailed description (continued)

Property	Value
Origin	NXP
Symbolic Name	false
Default	SW_PRE_TRIGGER_DISABLE
Range	SW_PRE_TRIGGER_DISABLE SW_PRE_TRIGGER_0 SW_PRE_TRIGGER_1 SW_PRE_TRIGGER_2 SW_PRE_TRIGGER_3

4.7.2.3 McuADC1TrigeeSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC1TRGSEL] - ADC1 trigger source select

Table 4-132. Attribute McuADC1TrigeeSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC1 trigger source
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	PDB
Range	PDB TRGMUX

4.7.2.4 McuADC0PreTrigeeSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC0PRETRGSE] - ADC0 pre-trigger source select

Table 4-133. Attribute McuADC0PreTrigeeSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC0 pre-trigger source
Type	ENUMERATION
Origin	NXP

Table continues on the next page...

Table 4-133. Attribute McuADC0PreTrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description (continued)

Property	Value
Symbolic Name	false
Default	PDB_PRE_TRIGGER
Range	PDB_PRE_TRIGGER TRGMUX_PRE_TRIGGER SOFTWARE_PRE_TRIGGER

4.7.2.5 McuADC0SoftwarePreTrigeerSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC0SWPRETRG] - ADC0 software pre-trigger sources

Table 4-134. Attribute McuADC0SoftwarePreTrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC0 software pre-trigger source
Type	ENUMERATION
Origin	NXP
Symbolic Name	false
Default	SW_PRE_TRIGGER_DISABLE
Range	SW_PRE_TRIGGER_DISABLE SW_PRE_TRIGGER_0 SW_PRE_TRIGGER_1 SW_PRE_TRIGGER_2 SW_PRE_TRIGGER_3

4.7.2.6 McuADC0TrigeerSourceSelect (McuAdcOptionsConfiguration)

SIM_ADCOPT[ADC2TRGSEL] - ADC0 trigger source select

Table 4-135. Attribute McuADC0TrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	ADC0 trigger source
Type	ENUMERATION
Origin	NXP

Table continues on the next page...

Table 4-135. Attribute McuADC0TrigeerSourceSelect (McuAdcOptionsConfiguration) detailed description (continued)

Property	Value
Symbolic Name	false
Default	PDB
Range	PDB TRGMUX

4.7.2.7 McuSoftwareTriggerToTRGMUX (McuAdcOptionsConfiguration)

SIM_MISCTRL[SW_TRG] - Software Trigger bit to TRGMUX

Note: Implementation Specific Parameter.

Table 4-136. Attribute McuSoftwareTriggerToTRGMUX (McuAdcOptionsConfiguration) detailed description

Property	Value
Label	Software Trigger to TRGMUX
Type	BOOLEAN
Origin	NXP
Symbolic Name	false
Default	false

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Document Number UM2ADCASR4.2 Rev0002R1.0.1
Revision 1.0