User's Manual

AUTOSAR MCAL R4.0.3 User's Manual

SPI Driver Component Ver.1.0.2

Generation Tool User's Manual

Target Device:
RH850/P1x-C

Renesas Electronics
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Abbreviations and Acronyms

Abbreviation / Acronym	Description
AUTOSAR	AUTomotive Open System ARchitecture
BSWMDT	Basic Software Module Description Template
CSIH	Enhanced Queued Clocked Serial Interface.
DEM	Diagnostic Event Manager
EB	External Buffer
ECU	Electronic Control Unit
e.g	Example
Hz	Hertz
HW	Hardware
IB	Internal Buffer
Id	Identifier
MCAL	MicroController Abstraction Layer
MCU	Micro Controller Unit
Rx	Receive
SPI	Serial Peripheral Interface
Tx	Transmit
XML	eXtensible Mark-up Language
ARXML	AutosaR eXtensible Mark-up Language

Definitions

Terminology	Description
BSWMDT File	This file is the template for the Basic Software Module Description.
Configuration XML File	This file contains the setting of command line options.
ECU Configuration Description File	Input file to MCAL Code Generator Tool. It is generated by ECU Configuration Editor.
Sl.No	Serial Number.

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Chapter 1 Introduction

The SPI Driver component provides the service for initializing the whole SPI structure of the microcontroller.

The SPI Driver Component comprises of two sections as Embedded Software and the MCAL Code Generator Tool to achieve scalability and configurability.

The document describes the SPI module specific inputs and outputs of the MCAL Code Generator Tool that is the common code generator engine used for the generation of the configuration code for all MCAL modules. MCAL Code Generator Tool is a command line tool that extracts information from ECU Configuration Description File and generates SPI Driver C Source and C Header files (Spi_Cfg.h, Spi_Cbk.h, Spi_PBcfg.c and Spi_Lcfg.c).

1.1. Document Overview

This user manual is organized as given in the table below:

Table 1-1 Document Overview

Section	Contents
Section 1 (Introduction)	Provides an introduction to the document and explains how information is organized in this manual.
Section 2 (Reference)	Provides a list of documents referred while developing this document.
Section 3 (Code Generation Overview)	Provides the Code Generation Overview.
Section 4 (Input Files)	Provides information about ECU Configuration Description File.
Section 5 (Output Files)	Explains the output files that are generated by the MCAL Code Generator Tool.
Section 6 (Precautions)	Contains precautions to be taken during configuration of ECU Configuration Description File.
Section 7 (User Configuration Validation)	Describes about user configuration validation done by the MCAL Code Generator Tool.
Section 8 (Configuration Overview)	Provides Container Overview.
Section 9 (Messages)	Describes all the Error/Warning/Information messages of R4.0.3 which helps the user to understand the probable reason for the same.

Chapter 2 Reference

2.1. Reference Documents

The following table lists the documents referred to develop this document:

Table 2-1 Reference Documents

Sl.No.	Title	Version
1.	AUTOSAR_SWS_SPIHandlerDriver.pdf	3.2.0
2.	MCAL_CodeGenerator_Tool_UserManual.pdf	1.7
3.	R20UT3828EJ0100-AUTOSAR.pdf	1.0.2

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Chapter 3 Code Generation Overview

Code Generation overview is shown below.

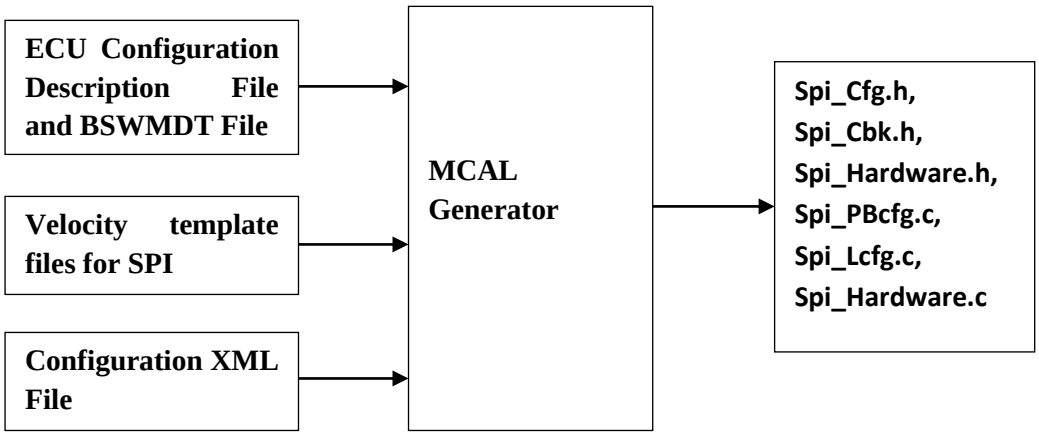

Figure 3-1 Overview of Code Generation

- ECU Configuration Description File (.arxml):
  This file will contain SPI Driver specific configuration information. This file should be generated by AUTOSAR specified Configuration Editor.

- BSWMDT File (.arxml):
  MCAL Code Generator Tool uses “Common Published Information” from SPI module specific BSWMDT File. SPI module specific BSWMDT File should not be updated manually since it is “Static Configuration” file.

- Velocity template files:
  Spi_Lcfg_c.vm, Spi_PBcfg_c.vm, Spi_Cfg_h_vm, Spi_Cbk_h_vm, Spi_Hardware_c.vm, Spi_Hardware_h_vm, Spi_Validate.vm and CommonHelper.vm
  They are interpreted by the MCAL Code Generator Tool in order to provide user input validation and generate the final output file needed by the AUTOSAR configuration chain .They are the "logic" of the Code Generator.

- Configuration XML File (.xml):
  This file is used to specify which velocity template to use and their location and the name of the output file generated.

For the error free input file, the MCAL Code Generator Tool generates the following output files:
Spi_Lcfg.c, Spi_PBcfg.c, Spi_Cfg.h, Spi_Cbk.h, Spi_Hardware.c, and Spi_Hardware.h. If there are incorrect values or incorrect dependencies, the MCAL Code Generator Tool will display error, warning and information messages. In case of errors, the MCAL Code Generator Tool will abort the execution.
ECU Configuration Description File can be created or edited using ECU Configuration Editor.

Concept of execution for MCAL Code Generator Tool is as follows:

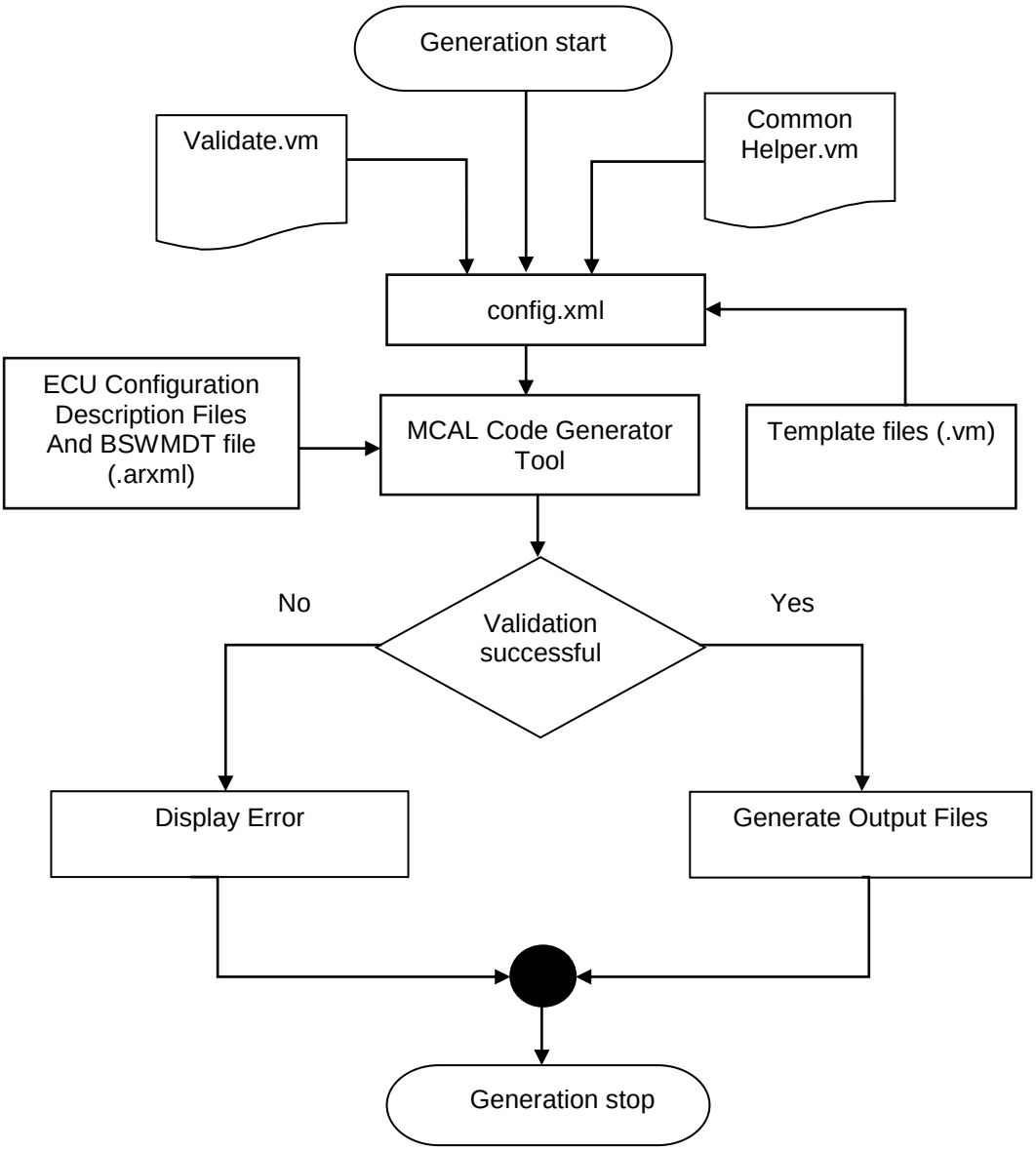

Figure 3-2 Flow-Diagram of Code Generation

The module “Validate” will validate the configuration (contents of ECU Configuration Description File(s) as input). If there are incorrect values or incorrect dependencies, the MCAL Code Generator Tool will display error, warning and information messages. In case of errors, the MCAL Code Generator Tool will abort the execution.

Spi_Cbk_h_vm / Spi_Cfg_h.vm / Spi_PBcfg_c.vm / Spi_Lcfg_c.vm will generate compiler switch / structures necessary to the AUTOSAR Configuration chain and vendor specific parameters.

Spi_Hardware_h.vm / Spi_Hardware_c.vm will generate hardware related info (defines number of actual instances / channels used / structure to access to the I/O mapped peripheral).

Remark Please consult the general MCAL Code Generator Tool User Manual (MCAL_CodeGenerator_Tool_UserManual.pdf) and R20UT3828EJ0100-AUTOSAR.pdf for details about the MCAL Code Generator Tool command line options.

Chapter 4 Input Files

MCAL Code Generator Tool will accept the config.xml file which has paths to the Velocity template files for generating Spi Driver files. MCAL Code Generator Tool accepts ECU Configuration Description File(s) and BSWMDT File as input. MCAL Code Generator Tool needs information about SPI Driver module. Hence ECU Configuration Description File should contain configuration of SPI Driver module. MCAL Code Generator Tool ignores any other AUTOSAR component configured in the ECU Configuration Description File. ECU Configuration Description File can be generated using configuration editor.

ECU Configuration Description File must comply with AUTOSAR standard ECU Configuration Description File format

Remark The detailed explanation about the parameters and containers are found in Parameter Definition File.

Chapter 5 Output Files

MCAL Code Generator Tool generates configuration details in C Header and C Source files (Spi_Lcfg.c, Spi_PBcfg.c, Spi_Cbk.h, Spi_Cfg.h Spi_Hardware.h and Spi_Hardware.c).

The content of each output file is given in the table below:

Table 5-1 Output Files Description

Output File	Details
Spi_Cfg.h	This file contains pre-compile time parameters and handles. It contains the macro definitions for development error detects, version info API, Instance ID, Pre-compile option for enable or disable inter-module dependencies, Interruptible SpiSequence handling functionality, etc. This file also contains SPI interrupt switches for each job and DMA interrupt switches.
Spi_Cbk.h	This file contains callback function prototype declarations to be used by application.It contains macro definition for AUTOSAR specification version information and File version information.
Spi_PBcfg.c	This file contains post-build time parameters. It provides the information of structures Spi_GstChannelConfig0, Spi_GaaChannelList0, Spi_GstDmaUnitConfig0, Spi_GstConfiguration.It also contains the configuration details for all configured jobs.
Spi_Lcfg.c	This file contains structures of link time parameters. It provides information about hardware unit.
Spi_Hardware.h	This file contains the definitions for addresses of the hardware registers used in the Spi Driver Module.
Spi_Hardware.c	This file contains the declarations for addresses of the hardware registers used in the Spi Driver Module.

Remark Output files generated by MCAL Code Generator Tool should not be modified or edited manually.

Chapter 6 Precautions

- ECU Configuration Description File and BSWMDT File must comply with AUTOSAR standard for R4.0.3 ECU Configuration Description File and BSWMDT File respectively.
- The input file must contain SPI Driver module.
- Configuration XML File should contain the file extension '.xml'.
- Configuration XML File: config.xml file should convey velocity template file location and output file location.
- All the function names and the string values configured should follow C syntax for variables. It can only contain alphanumeric characters and "_". It should start with an alphabet.
- If the output files generated by MCAL Code Generator Tool are modified externally, then they may not produce the expected results or may lead to error/warning/Information messages.
- Short Name for a container should be unique within a name space.
- An error free ECU Configuration Description File generated from configuration editor has to be provided as input to the MCAL Code Generator Tool. Otherwise MCAL Code Generator Tool may not produce the expected results or may lead to errors/warnings/information messages.
- The description file should always be generated using AUTOSAR specified configuration editor and it should not be edited manually

Remark Please refer the SPI Component User Manual (R20UT3659EJ0100-AUTOSAR.pdf) for deviations from AUTOSAR.

Chapter 7 User Configuration Validation

This section provides help to analyze the error, warning and information messages displayed during the execution of MCAL Code Generator Tool. It ensures conformance of input file with syntax and semantics. It also performs validation on the input file for correctness of the data.

For more details on list of Error/Warning/Information messages that are displayed as a result of input file(s) validation, refer Chapter 9 "*Messages*".

The MCAL Code Generator Tool displays error or warning or information when the user has configured incorrect inputs. The format of Error/Warning/Information message is as shown below.
<message_type>_<vendor_id>_<module_id>_<message_id>:<message_ content>.

where,

- <message_type> : ERR/WARNING/INFO
- < vendor_id > : vendor Id = 59
- < module_id >: 83 - SPI Driver Module id (83) for user configuration checks.
- < Message_id.> : 001-999
- <message_content>: Message content provides information about error or warning or information displayed when the user has configured incorrect inputs.

  File Name' and 'Path' need not be present for all Error/Warning/Information messages

  File Name: Name of the file in which the error has occurred

  Path: Absolute path of the container in which the parameter is present

Chapter 8 Configuration Overview

8.1. Container Overview

The following figure represents container overview.

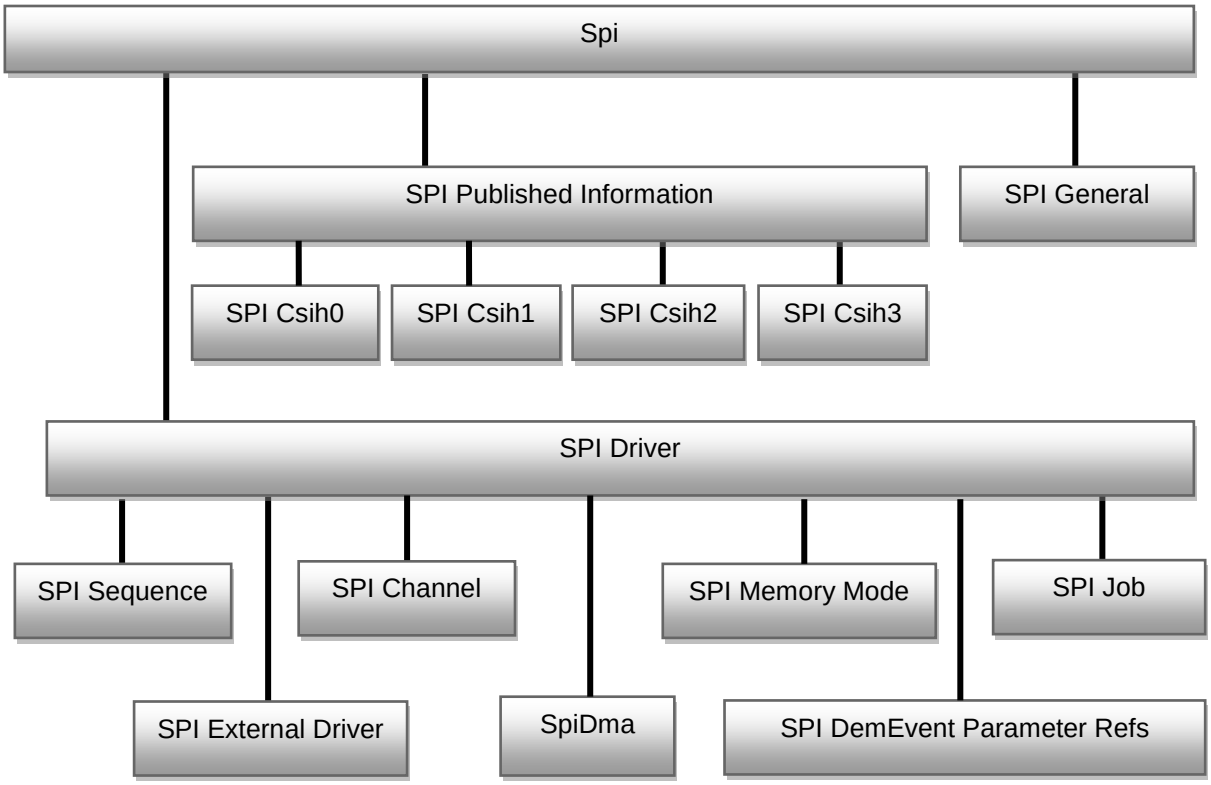

Figure 8-1 Configuration overview

8.1.1 Pre-Compile Configurable Parameters

Table 8-1 Pre-Compile Configurable Parameters

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
SpiGeneral	SpiCancelApi	Boolean	TRUE / FALSE	Switches the Spi_Cancel function ON or OFF.
	SpiChannelBuffersAllowed	Integer	0/1/2	Selects the SPI Handler/Driver Channel Buffers usage allowed and delivered.
	SpiDevErrorDetect	Boolean	TRUE / FALSE	Switches the Development Error Detection and Notification ON or OFF

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiHwStatusApii	Boolean	TRUE / FALSE	Switches the Spi_GetHWUnitStatus function ON or OFF.
	SpiInterruptibleSeqAllowed	Boolean	TRUE / FALSE	Switches the Interruptible Sequences handling functionality ON or OFF.
	SpiLevelDelivered	Integer	0/1/2	Selects the SPI Handler/Driver level of scalable functionality that is available and delivered.
	SpiSupportConcurrentSyncTransmit	Boolean	TRUE / FALSE	Specifies whether concurrent Spi_SyncTransmit() calls for different sequences shall be configurable.
	SpiVersionInfoApi	Boolean	TRUE / FALSE	Switches the Spi_GetVersionInfo function ON or OFF.
	SpiDmaMode	Boolean	TRUE / FALSE	This parameter switches the Spi_DmaMode ON or OFF.
	SpiDeviceName	Enumeration	R7F701370A R7F701371 R7F701372 R7F701373 R7F701374	This parameter contains the supported device name
	SpiDmaTypeUsed	Enumeration	SPI_DMA_TYPE_TWO	This parameter is used to differentiate the DMA type used.
	SpiDataConsistencyCheckEnable	Boolean	TRUE / FALSE	This parameter enables/disables Data Consistency check

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiDataWidthSelection	Enumeration	BITS_8/ BITS_16/ BITS_32	The value of the parameter is the maximum data width selected.
	SpiCriticalSectionProtection	Boolean	TRUE / FALSE	This parameter specifies if the SPI driver CPU load can be reduced by disabling the enter/exit critical section functionality by adding a precompiled configuration parameter to the SPI driver configuration.
	SpiVersionCheckExternalModules	Boolean	TRUE / FALSE	Enable / disable AUTOSAR Version check for inter-module dependencies
	SpiHighPriorityHwHandlingEnable	Boolean	TRUE / FALSE	Enable / disable the Spi H/W priority.
	SpiAlreadyInitDetCheck	Boolean	TRUE / FALSE	This parameter enables / disables the SPI_E_ALREADY_INITIALIZED Det check in Spi_Init API.
	SpiSeqStartNotificationEnable	Boolean	TRUE / FALSE	This parameter enables / disables the SPI_E_ALREADY_INITIALIZED Det check in Spi_Init API.
	SpiSyncSeqEndNotificationEnable	Boolean	TRUE / FALSE	This parameter enables / disables the check for the names configured for synchronous transmissions in SpiSeqEndNotification
	SpiPersistentHWConfiguration	Boolean	TRUE / FALSE	This parameter enables / disables the check when HW configuration is static or dynamic HW.
	SpiMaxBaudrate	Enumeration	PCLK_DIV_BY_8	This parameter is used to

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
				differentiate the maximum baud rate between the variants
	SpiTimeOut	Integer	0-65535	This parameter contains timeout value for updating the status registers of CSIH (CSIHnSTR0) during data transmission.
	SpiInternalErrorBuffer Size	Integer	0-100	This parameter is the maximum array size of the Error Buffer used for the internal Diagnosis.
	SpiLoopBackSelfTest	Enumeration	LoopBack_None LoopBack_Init LoopBack_Init_ RunTime	This parameter is used to select if the Loop back self-test functionality to be done only during initialization or during init and Run time or not required to be performed
	SpiECCSelfTest	Enumeration	ECC_None ECC_Init ECC_Init_RunTi me	This parameter is used to select if the ECC self-test functionality to be done only during initialization or during init and Run time or not required to be performed
	SpiInterruptConsisten cyCheck	Boolean	TRUE / FALSE	This parameter shall enable/disable the Interrupt consistency check functionality
	SpiCSIHWriteVerify	Enumeration	WV_DISABLE WV_INIT_ONLY WV_INIT_RUNT IME	This parameter shall enable/disable the write-verify check functionality.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiDMAWriteVerify	Enumeration	WV_DISABLE WV_INIT_ONLY WV_INIT_RUNTIME	This parameter shall enable/disable the write-verify check functionality for DMA
	Spi_UseWriteVerifyErrorInterface	Boolean	TRUE / FALSE	This parameter shall enable/disable the error
	SpiWriteVerifyErrorInterface	Symbolic Name	NA	This parameter is used to configure the name of the error notification function which shall be called with the ApiID and ErrorId when there is a Write Verify error when Spi_UseWriteVerifyErrorInterface is configured as True.
SpiChannel	SpiChannelId	Integer	0-255	This parameter contains Channel ID of the SPI channel. This value will be assigned to the symbolic name derived of the SpiChannel container short name.
	SpiChannelType	Enumeration	EB/IB	This parameter contains the buffer usage with EB/IB channel.
	SpiEbMaxLength	Integer	0-65535	This parameter contains the maximum size (in bytes) of data buffers in case of EB Channels.
	SpiIbNBuffers	Integer	0-65535	This parameter contains the maximum number of data buffers in case of IB Channels.
SpiDemEventParameterRefs	SPI_E_HARDWARE_ERROR	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when a hardware error was detected. If

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
				the reference is not configured the error shall not be reported.
	SPI_E_DATA_TX_TIMEOUT_FAILURE	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when a hardware data transmit timeout error was detected. If the reference is not configured the error shall not be reported.
	SPI_E_LOOPBACK_SELFTEST_FAILURE	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when loop back self-test error was detected.
	SPI_E_ECC_SELFTEST_FAILURE	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when Ecc selft test error was detected.
	SPI_E_INT_INCONSISTENT	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when Interrupt consistency error was detected.
	SPI_E_REG_WRITE_VERIFY	Symbolic Name	NA	Reference to the DemEventParameter which shall be issued when register write error was detected.
SpiExternalDevice	SpiCsIdentifier	string	-	This parameter is the symbolic name to identify the Chip Select (CS) allocated to this Job. This parameter is not used for implementation.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiHwUnit	Enumeration	CSIH0/ CSIH1/ CSIH2/ CSIH3	This parameter is the symbolic name to identify the HW SPI Hardware microcontroller peripheral allocated to this Job.

8.1.2 Post Build Time Configurable Parameters

Table 8-2 Post-Build-Time Configurable Parameters

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
SpiChannel	SpiDataWidth	Integer	2-32	This parameter is the width of a transmitted data unit. If data width is greater than 16bit, then CSIHnCTL1.CSIHnEDLE bit is set to enable Extended Data Length.
	SpiDefaultData	Integer	0-4294967295	The default data to be transmitted when (for internal buffer or external buffer) the pointer passed to Spi_WriteIB (for internal buffer) or to Spi_SetupEB (for external buffer) is NULL.
	SpiTransferStart	Enumeration	LSB/MSB	This parameter defines the first starting bit for transmission.
SpiExternalDevice	SpiBaudrate	Float	0	This parameter is the communication baud rate. This parameter is not used for implementation, set SpiBaudrateConfiguration instead.
	SpiBaudrateConfiguration	Integer	1-4095	This parameter contains Baud Rate Selection Bits.
	SpiCsPolarity	Enumeration	HIGH/LOW	This parameter defines the active polarity of Chip Select.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsSelection	Enumeration	CS_VIA_PERIPHERAL_ENGINE / CS_VIA_GPIO	When the Chip select handling is enabled (see SpiEnableCs), then this parameter specifies if the chip select is handled automatically by Peripheral HW engine or via general purpose IO by Spi driver.
	SpiDataShiftEdge	Enumeration	LEADING/ TRAILING	This parameter defines the SPI data shift edge.
	SpiEnableCs	Boolean	TRUE / FALSE	This parameter enables or disables the Chip Select handling functions.
	SpiShiftClockIdlelevel	Enumeration	HIGH/LOW	This parameter defines the SPI shift clock idle level.
	SpiTimeClk2Cs	Float	0	Timing between clock and chip select - This parameter allows to use a range of values from 0 up to 100 microseconds. This parameter is not used for implementation, set SpiClk2CsCount instead.
	SpiClk2CsCount	Integer	0-100	Loop Count between clock and chip select - This parameter allows to use a range of values from 0 to 100 counts
	SpiCsInactiveAfterLastData	Boolean	TRUE / FALSE	This parameter enables or disables the Chip Select to Return to Inactive functions.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsIdleEnforcement	Boolean	TRUE / FALSE	This parameter enables or disables Chip Select Idle Enforcement configuration.
	SpiCsIdleTiming	Enumeration	IDLE_TIME_0_POINT_5/ IDLE_TIME_1/ IDLE_TIME_1_POINT_5/ IDLE_TIME_2_POINT_5/ IDLE_TIME_3_POINT_5/ IDLE_TIME_4_POINT_5/ IDLE_TIME_6_POINT_5/ IDLE_TIME_8_POINT_5	This parameter specifies Idle Timing.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsHoldTiming	Enumeration	HOLD_TIME_0_POINT_5/ HOLD_TIME_1/ HOLD_TIME_1_POINT_5/ HOLD_TIME_2_POINT_5/ HOLD_TIME_3_POINT_5/ HOLD_TIME_4_POINT_5/ HOLD_TIME_6_POINT_5/ HOLD_TIME_8_POINT_5/ HOLD_TIME_9_POINT_5/ HOLD_TIME_10_POINT_5/ HOLD_TIME_11_POINT_5/ HOLD_TIME_12_POINT_5/ HOLD_TIME_14_POINT_5/ HOLD_TIME_16_POINT_5/ HOLD_TIME_18_POINT_5/ HOLD_TIME_20_POINT_5	This parameter specifies Hold Timing.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsHoldTiming	Enumeration	HOLD_TIME_0_POINT_5/ HOLD_TIME_1/ HOLD_TIME_1_POINT_5/ HOLD_TIME_2_POINT_5/ HOLD_TIME_3_POINT_5/ HOLD_TIME_4_POINT_5/ HOLD_TIME_6_POINT_5/ HOLD_TIME_8_POINT_5/ HOLD_TIME_9_POINT_5/ HOLD_TIME_10_POINT_5/ HOLD_TIME_11_POINT_5/ HOLD_TIME_12_POINT_5/ HOLD_TIME_14_POINT_5/ HOLD_TIME_16_POINT_5/ HOLD_TIME_18_POINT_5/ HOLD_TIME_20_POINT_5	This parameter specifies Hold Timing.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsInterData Delay	Enumeration	INTER_DATA_TIME_0/ INTER_DATA_TIME_0_POINT_5/ INTER_DATA_TIME_1/ INTER_DATA_TIME_2/ INTER_DATA_TIME_3/ INTER_DATA_TIME_4/ INTER_DATA_TIME_6/ INTER_DATA_TIME_8/ INTER_DATA_TIME_9/ INTER_DATA_TIME_10/ INTER_DATA_TIME_11/ INTER_DATA_TIME_12/ INTER_DATA_TIME_14/ INTER_DATA_TIME_16/ INTER_DATA_TIME_18/ INTER_DATA_TIME_20	This parameter specifies Inter-data Delay Timing.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiCsSetupTime	Enumeration	SETUP_TIME_0_POINT_5/ SETUP_TIME_1/ SETUP_TIME_1_POINT_5/ SETUP_TIME_2_POINT_5/ SETUP_TIME_3_POINT_5/ SETUP_TIME_4_POINT_5/ SETUP_TIME_6_POINT_5/ SETUP_TIME_8_POINT_5/ SETUP_TIME_9_POINT_5/ SETUP_TIME_10_POINT_5/ SETUP_TIME_11_POINT_5/ SETUP_TIME_12_POINT_5/ SETUP_TIME_14_POINT_5/ SETUP_TIME_16_POINT_5/ SETUP_TIME_18_POINT_5/ SETUP_TIME_20_POINT_5	This parameter specifies Setup Timing.
	SpiInputClockSelect	Enumeration	PCLK/ PCLK_DIVBY_2/ PCLK_DIVBY_4/ PCLK_DIVBY_8/ PCLK_DIVBY_16/ PCLK_DIVBY_32/ PCLK_DIVBY_64	This parameter contains the Prescaler Section Bits.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
	SpiBaudrateRegisterSelect	Enumeration	CSIH_BAUDRATE_REGISTER_0/ CSIH_BAUDRATE_REGISTER_1/ CSIH_BAUDRATE_REGISTER_2/ CSIH_BAUDRATE_REGISTER_3	This parameter contains the Prescaler Selection
	SpiInterruptDelayMode	Boolean	TRUE / FALSE	This parameter enables delay for all interrupts.
	SpiParitySelection	Enumeration	NO_PARITY/ PARITY_AT_ZERO/ ODD_PARITY/ EVEN_PARITY	This parameter defines the Parity selection.
	SpiBroadcastingPriority	Integer	DOMINANT/ RECESSIVE	This parameter gives the timeout setting selection in FIFO mode
	SpiClockFrequencyRef	Reference	-	This parameter contains Assignment of the MCU frequency for a job.
SpiSequence	SpiInterruptibleSequence	Boolean	TRUE / FALSE	This parameter allows or denies this Sequence to be suspended by another one.
	SpiSeqStartNotification	Function name	NA	This parameter is a reference to a start notification function.
	SpiHighPriorityHwSequence	Boolean	TRUE / FALSE	Enable/Disable the high priority H/W handling
	SpiSeqEndNotification	Function Name	NA	This parameter is a reference to a notification function.
	SpiSequenceId	Integer	0-255	This parameter specifies sequence ID of the SPI sequence. This value will be assigned to the symbolic name derived of the SpiSequence container short name.
	SpiJobAssignment	Reference	NA	A sequence references several jobs, which are executed during a communication sequence.
	SpiChannelIndex	Integer	0-255	This parameter specifies the order of Channels within the Job.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
SpiChannelList	SpiChannelAssignment	Reference	NA	A job reference to a SPI channel.
	SpiHwUnitSelection	Enumeration	CSIH0/ CSIH1/ CSIH2/ CSIH3	This parameter is used to select CSIH HW unit
SpiMemoryMode	SpiMemoryModeSelection	Enumeration	TX_ONLY_MODE/ DIRECT_ACCESS_MODE/ DUAL_BUFFER_MODE/ FIFO_MODE	This parameter defines the Memory Mode Selection.
	SpiTxDmaChannel	Enumeration	DMA0/ DMA1/ DMA2/ DMA3/ DMA4/ DMA5/ DMA6/ DMA7/ DMA8/ DMA9/ DMA10/ DMA11/ DMA12/ DMA13/ DMA14/ DMA15	This parameter is the symbolic name to identify the Tx DMA allocated to Job.
SpiDma	SpiRxDmaChannel	Enumeration	DMA0/ DMA1/ DMA2/ DMA3/ DMA4/ DMA5/ DMA6/ DMA7/ DMA8/ DMA9/ DMA10/ DMA11/ DMA12/ DMA13/ DMA14/ DMA15	This parameter is the symbolic name to identify the Rx DMA allocated to Job.
	SpiDmaHwUnit	Enumeration	CSIH1_TXID_82_RXID_81/ CSIH0_TXID_79_RXID_78/ CSIH2_TXID_85_RXID_84/ CSIH3_TXID_88_RXID_87	This parameter is the symbolic name to identify the hardware unit.
	SpiMaxHwUnit	Integer	4	Number of different SPI hardware microcontroller peripherals (units/busses) available and handled by this SPI Handler/Driver module.

Container Name	Parameter Name	Parameter Type	Parameter Range	Parameter Description
SpiPublishedInformation	SpiMaxHwUnit	integer	4	Number of different SPI hardware microcontroller peripherals (units/busses) available and handled by this SPI Handler/Driver module.

Chapter 9 Messages

The messages help to identify the syntax or semantic errors in the ECU Configuration Description File. Hence it ensures validity and correctness of the information available in the ECU Configuration Description File.

The following section gives the list of error, warning and information messages displayed by the MCAL Code Generator Tool.

9.1 Error Messages

ERR_59_83_001: Parsing of Spi module is incorrect. This error occurs, if the parsing of configuration file is not done correctly.

ERR_59_83_002: Field 'Field Name' is empty in the entity 'Structure Name'. This error occurs, if the structure fields that are to be generated in the output file are empty.

ERR_59_83_004: The parameter 'parameter name' in the container 'container name' should be configured.
This error occurs, if any of the mandatory configuration parameter(s) mentioned below is (are) not configured in ECU Configuration Description File.

Table 9-1 Mandatory Parameters

Parameter Name	Container Name
SpiCancelApi	SpiGeneral
SpiChannelBuffersAllowed	
SpiDevErrorDetect	
SpiHwStatusApi	
SpiInterruptibleSeqAllowed	
SpiLevelDelivered	
SpiSupportConcurrentSyncTransmit	
SpiVersionInfoApi	
SpiDmaMode	
SpiDataConsistencyCheckEnable	
SpiDataWidthSelection	
SpiMaxBaudrate	
SpiSyncSeqEndNotificationEnable	
SpiPersistentHWConfiguration	
SpiDmaTypeUsed	
SpiHighPriorityHwHandlingEnable	
SpiCriticalSectionProtection	
SpiDeviceName	

Parameter Name	Container Name
SpiAlreadyInitDetCheck	
SpiVersionCheckExternalModules	
SpiSeqStartNotificationEnable	
SpiTimeOut	
SpiLoopBackSelfTest	
SpiECCSelfTest	
SpiInterruptConsistencyCheck	
SpiWriteVerify	
SpiDmaWriteVerify	
SpiMaxChannel	SpiDriver
SpiMaxJob	
SpiMaxSequence	
SpiChannelId	SpiChannel
SpiChannelType	
SpiDataWidth	
SpiEbMaxLength	
SpiIbNBuffers	
SpiTransferStart	
SpiBaudrate	SpiExternalDevice
SpiCsPolarity	
SpiDataShiftEdge	
SpiShiftClockIdleLevel	
SpiCsIdentifier	
SpiEnableCs	
SpiHwUnit	
SpiTimeClk2Cs	
SpiClk2CsCount	
SpiBaudrateConfiguration	
SpiInputClockSelect	
SpiInterruptDelayMode	
SpiParitySelection	
SpiBroadcastingPriority	
SpiClockFrequencyRef	
SpiJobId	SpiJob
SpiJobPriority	

Parameter Name	Container Name
SpiSeqStartNotification	SpiSequence
SpiDeviceAssignment	
SpiInterruptibleSequence	
SpiSequenceId	
SpiHighPriorityHwSequence	
SpiJobAssignment	
SpiHwUnitSelection	SpiMemoryMode
SpiMemoryModeSelection	
SpiTxDmaChannel	SpiDma
SpiRxDmaChannel	
SpiDmaHwUnit	
SPI_E_HARDWARE_ERROR	SpiDemEventParameterRefs
SPI_E_DATA_TX_TIMEOUT_FAILURE	
SpiChannelIndex	SpiChannelList
SpiChannelAssignment	
SpiMaxHwUnit	SpiPublishedInformation

ERR_59_83_006: The value of the parameter 'SpiChannelType' in the container 'SpiChannel' should be same for SPI Channels (having same channel Id) across multiple configuration sets.
This error occurs, if the value of parameter SpiChannelType in the container SpiChannel is not same for SPI Channels (having same channel Id) across multiple configuration sets.

ERR_59_83_007: The number of SPI channels configured should be same across the multiple configurations set container 'SpiDriver'.
This error occurs, if the number of SPI channels configured is not same across the multiple configurations set container SpiDriver.

ERR_59_83_008: The value of the parameters 'SpiEbMaxLength' and 'SpiIbNBuffers' in the container 'SpiChannel' should be same for SPI Channels (having same channel Id) across multiple configuration sets.
This error occurs, if the value for parameters SpiEbMaxLength and SpiIbNBuffers are not same for all SPI Channels (having same channel Id) across multiple configuration sets in ECU Configuration Description File.

ERR_59_83_009: Minimum one_ SpiDemEventParameterRefs instance is needed.
This error will occur, if at least one DEM component is not present in the input ECU Configuration Description File(s).
ERR_59_83_010: Maximum allowed SpiDemEventParameterRefs instance is one.
This error will occur, if more than one DEM component is present in the input ECU Configuration Description File(s).

ERR_59_83_011: References SPI_E_DATA_TX_TIMEOUT_FAILURE is not configured in <Spi/ SpiDriver/SpiDemEventParameterRefs>.
This error occurs, if the parameter SPI_E_DATA_TX_TIMEOUT_FAILURE not configured.

ERR_59_83_012: References path of Parameter SPI_E_DATA_TX_TIMEOUT_FAILURE is not correct in <Spi/ SpiDriver/SpiDemEventParameterRefs>.
This error occurs, if incorrect reference provided for the reference parameter ('SPI_E_DATA_TX_TIMEOUT_FAILURE').

ERR_59_83_013: References SPI_E_HARDWARE_ERROR is not configured in <Spi/ SpiDriver/SpiDemEventParameterRefs>.
This error occurs, if the parameter SPI_E_HARDWARE_ERROR not configured**.**

ERR_59_83_014: Reference path of Parameter SPI_E_HARDWARE_ERROR is not correct in <Spi/ SpiDriver/SpiDemEventParameterRefs>.
This error occurs, if incorrect reference provided for the reference parameter ('SPI_E_HARDWARE_ERROR).

ERR_59_83_015: References SpiChannelAssignment is not configured in <Spi/ SpiDriver/SpiExternalDevice/SpiJob/ SpiChannelList>.
This error occurs, if the parameter SpiChannelAssignment not configured.

ERR_59_83_016: References path of Parameter SpiChannelAssignment is not correct in <Spi/ SpiDriver/SpiExternalDevice/SpiJob/ SpiChannelList>.
This error occurs, if incorrect reference provided for the reference parameter ('SpiChannelAssignment).

ERR_59_83_017: References SpiDeviceAssignment is not configured in <Spi/ SpiDriver/SpiExternalDevice/SpiJob>.
This error occurs, if the parameter SpiDeviceAssignment not configured.

ERR_59_83_018: References path of Parameter SpiDeviceAssignment is not correct in <Spi/ SpiDriver/SpiExternalDevice/SpiJob>.
This error occurs, if incorrect reference provided for the reference parameter ('SpiDeviceAssignment).

ERR_59_83_019: Parameter <Parameter> is not configured in <Spi/ SpiDriver/SpiExternalDevice/SpiJob>.
This error occurs, if any parameter in job container are not configured.

ERR_59_83_020: References SpiJobAssignment is not configured in <Spi/ SpiDriver/ SpiSequence >.
This error occurs, if the parameter SpiJobAssignment not configured.

ERR_59_83_021: The value of the parameter 'SpiJobEndNotification' present in the container 'SpiJob' should be same for SPI jobs (having same Job Id).
This error occurs, if the parameter SpiJobEndNotification in the container SpiJob is not same for SPI jobs (having same Job Id) across multiple configuration sets in ECU Configuration Description File

ERR_59_83_022: The value for the parameter ‘SpiHwUnitSynchronous’ in the container ‘SpiJob' should be same for jobs that are associated with same sequence.
This error occurs, if the value for the parameter SpiHwUnitSynchronous in the container SpiJob is not same for jobs that are associated with same sequence. In general, the transfer mode of the jobs (that are associated with same sequence) should be same.

ERR_59_83_024: The value configured for the parameter 'parameter name' should follow C Syntax < [a-zA-Z] [a-zA-Z0-9_] >.
This error occurs, if the value of configuration parameters mentioned below does not adhere to C syntax i.e., the value should not contain characters other than (a-z, A-Z, 0-9 or “_”) and it also should start with an alphabet.

Table 9-2 Naming Parameters

Parameter Name	Container Name
SpiJobEndNotification	SpiJob
SpiSeqEndNotification	SpiSequence

ERR_59_83_026: The value of the parameter ‘SpiMemoryModeSelection’ in the container ‘SpiMemoryMode’ should be same across the multiple configurations set container ‘SpiDriver’.
This error occurs, if the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is not same across the multiple configurations set container SpiDriver.

ERR_59_83_028: The short name of the container ‘SpiJob’ should be same for job having same 'SpiJobId' <value for SpiJobId> across multiple configurations set container ‘SpiDriver’.
This error occurs, if the short name of the container SpiJob is not same for SPI jobs (having same job Id) across multiple configurations set container SpiDriver.
ERR_59_83_030: Maximum allowed SpiCsih0 instance is one.
This error occurs, if multiple instance of SpiCsih0 is configured in SpiPublishedInformation**.**

ERR_59_83_031: Parameter <SpiChannelId> is not configured in sequential in <Spi/SpiDriver/ SpiChannel>.
This error occurs, if the value for parameter SpiChannelId present in the container SpiChannel is not starting with zero and also not sequential or with gaps for any given configuration set.

ERR_59_83_032: SpiChannelBuffersAllowed in the container SpiGeneral is configured as 1 and the parameter SpiChannelType in any of the container SpiChannel is not configured as EB in SpiDriver.

This error occurs, if SpiChannelBuffersAllowed in the container SpiGeneral is configured as 1 and the parameter SpiChannelType in the container SpiChannel is not configured as EB.

ERR_59_83_033: SpiChannelBuffersAllowed in the container SpiGeneral is configured as 0 and the parameter SpiChannelType in any of the container SpiChannel is not configured as IB in SpiDriver.
This error occurs, if SpiChannelBuffersAllowed in the container SpiGeneral is configured as 0 and the parameter SpiChannelType in the container SpiChannel is not configured as IB.

ERR_59_83_034: The SPI channels configured for a specific job should not be repeated when the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <DUAL_BUFFER_MODE/TX_ONLY_MODE>.
This error will occur, if the value for channels configured for a specific job is repeated when the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE**.**

ERR_59_83_035: The SPI channels configured for a specific job should have same value for the parameter 'SpiDataWidth' of container 'SpiChannel' since the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <value of SpiMemoryModeSelection> within a sequence.
This error will occur, if the value for channels configured for a specific job is not same for the parameter SpiDataWidth of container SpiChannel when the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE or FIFO_MODE.

ERR_59_83_036: SpiDataWidth configured for a SpiChannel is greater than 8 but SpiDataWidthSelection in SpiGeneral0 is BITS_8.
This error occurs, if the value of the parameter SpiDataWidth in the container SpiChannel is not in the range of 7 to 8 when the parameter SpiDataWidthSelection in the container SpiGeneral is configured as BITS_8.

ERR_59_83_037: SpiDataWidth configured for a SpiChannel is greater than 16 but SpiDataWidthSelection in SpiGeneral0 is BITS_16.
This error occurs, if the value of the parameter SpiDataWidth in the container SpiChannel is not in the range of 7 to 16 when the parameter SpiDataWidthSelection in the container SpiGeneral is configured as BITS_16.

ERR_59_83_038: Parameter SpiJobId in SpiJob container is not configured in sequential.
This error occurs, if the value for parameter SpiJobId present in the container SpiJob is not sequential or with gaps and also not starting with zero for any given configuration set in the ECU Configuration Description File.

ERR_59_83_039: The value of the parameter 'SpiHwUnitSynchronous' in the container 'SpiJob' should be same for all jobs that are having same value for the parameter 'SpiHwUnit' in the container 'SpiExternalDevice' within a configuration set.
This error occurs, if the value for the parameter SpiHwUnitSynchronous in the container SpiJob is not same for jobs that are associated with same sequence. In general, the transfer mode of the jobs (that are associated with same sequence) should be same.

ERR_59_83_040: Parameter SpiHwUnitSelection in SpiMemoryMode and SpiMemoryMode$MemoryMode1 are same.
This error occurs, if the value of the parameter SpiHwUnitSelection in the container SpiMemoryMode is not unique within configuration set container SpiDriver.

ERR_59_83_041: Parameter SpiSequenceId in SpiSequence container is not configured in sequential.
This error occurs, if the parameter SpiSequenceId is not sequential or with gaps and also not starting with zero within the container SpiSequence for any of the given configuration set.

ERR_59_83_042: The value of the parameter SpiMaxChannel present in container SpiDriver is not equal to total number of channels configured.
This error occurs, if the value of the parameter SpiMaxChannel present in container SpiDriver is not equal to total number of channels configured within each SpiDriver container in ECU Configuration Description File**.**

ERR_59_83_043: The value of the parameter SpiMaxJob present in container SpiDriver$DriverCount is not equal to total number of jobs configured.
This error occurs, if the value of the parameter SpiMaxJob in the container SpiDriver is not equal to the total number of jobs configured within each SpiDriver container in ECU Configuration Description File.

ERR_59_83_044: The value of the parameter SpiMaxSequence present in container SpiDriver$DriverCount is not equal to total number of sequence configured.
This error occurs, if the value of the parameter SpiMaxSequence in the container SpiDriver is not equal to the total number of jobs configured within each SpiDriver container in ECU Configuration Description File.

ERR_59_83_045: The value configured for the parameter SpiLevelDelivered in the container SpiGeneral is 0 and the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is not configured as DIRECT_ACCESS_MODE.
This error occurs, if the value configured for the parameter SpiLevelDelivered in the container SpiGeneral is 0 and the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is not configured as DIRECT_ACCESS_MODE.

ERR_59_83_046: The parameter SpiDmaMode present in the container SpiGeneral is configured as true and no instance of the container SpiDma is configured in SpiDriver.
This error occurs, if the parameter SpiDmaMode present in the container SpiGeneral is configured as true and no instance of the container SpiDma is configured.

ERR_59_83_047: The value configured for the parameters ‘SpiTxDmaChannel’ and ‘SpiRxDmaChannel’ should be unique within a configuration set.
This error occurs, if the same DMA channel is configured for SpiTxDmaChannel or SpiRxDmaChannel of SpiDma container for hardware units (SpiDmaHwUnit) within a configuration set. DMA channel (Tx or Rx) should be unique within a configuration set.

ERR_59_83_048: SpiHwUnitSynchronous is configured as SYNCHRONOUS in the container SpiJob and same HWunit is configured for DMA in SpiDma.
This error occurs, if the SpiDmaMode parameter is configured as true and the same DMA HW unit is configured as SYNCHRONOUS in the parameter SpiHwUnitSynchronous of the container SpiJob.

ERR_59_83_049: DMA HW unit configured for the parameter SpiDmaHwUnit in the container SpiDma is configured with the memory mode of TX_ONLY_MODE or DUAL_BUFFER_MODE in SpiMemoryMode$MemoryMode.
This error occurs, if DMA HW unit configured for the parameter SpiDmaHwUnit in the container SpiDma is configured with the memory mode of TX_ONLY_MODE or DUAL_BUFFER_MODE.
If SpiHighPriorityHwHandlingEnable is configured as true in SpiGeneral container then the DMA HW unit configured for the parameter SpiDmaHwUnit in the container SpiDma can be configured with the memory mode of TX_ONLY_MODE.

ERR_59_83_050: SpiHwUnitSynchronous is configured as SYNCHRONOUS in the container SpiJob but memorymode is DIRECT_ACCESS_MODE in SpiMemoryMode.
This error occurs, if the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DIRECT_ACCESS_MODE and the respective HW Unit is configured for SYNCHRONOUS in the parameter SpiHwUnitSynchronous of the container SpiJob with the value configured for the parameter SpiLevelDelivered in the container SpiGeneral is 2.

ERR_59_83_051: SpiCsSelection is configured as CS_VIA_GPIO in the container SpiExternalDevice but SpiPortPinSelect is via CSL in SpiJob.
This error occurs, if the value of the parameter SpiPortPinSelect in the container SpiJob is configured as CSLn and the parameter SpiCsSelection present in the container SpiExternalDevice is configured as CS_VIA_GPIO. Here n is the integer number e.g. 0, 1, etc.

ERR_59_83_052: SpiCsSelection is configured as PERIPHERAL_ENGINE in the container SpiExternalDevice but SpiPortPinSelect is via GPIO in SpiJob.
This error occurs, if the value of the parameter SpiPortPinSelect in the container SpiJob is configured as Port group related pins and the parameter SpiCsSelection present in the container SpiExternalDevice is configured as CS_VIA_PERIPHERAL_ENGINE.

ERR_59_83_053: Parameter SpiMemoryModeSelection in container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE but the channel for corresponding HWunit is configured as EB.
This error occurs, if the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE and the parameter SpiChannelType in the container SpiChannel is not configured as IB.
The value of the parameter SpiChannelType in the SpiChannel container can be configured as EB, if the parameter SpiHighPriorityHwHandlingEnable is configured as true in SpiGeneral container and if this channel is linked to a job which is linked to a high priority sequence.

ERR_59_83_054: Parameter SpiMemoryModeSelection in container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE but the value of the parameter SpiInterruptibleSequence in the container SpiSequence is configured as true.
This error occurs, if the jobs connected to the sequence having the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE and the value of the parameter SpiInterruptibleSequence in the container SpiSequence is not configured false.

ERR_59_83_055: The value of parameter 'SpiHighPriorityHwSequence' present in the container 'SpiSequence' should be configured as <true> for at least one of the sequences, since the parameter 'SpiHighPriorityHwHandlingEnable' present in the container 'SpiGeneral' is configured as <true>
The error occurs, if the value of the parameter SpiHighPriorityHwSequence present in the container SpiSequence is not configured as true for none of the sequences and the value of parameter SpiHighPriorityHwHandlingEnable present in the container SpiGeneral is configured as true.

ERR_59_83_056: SpiMemoryModeSelection for the Spi Hardware unit <Hardware unit> should be <TX_ONLY_MODE>, since the parameter 'SpiHighPriorityHwSequence' in the SpiSequence container is configured as <true> for the sequence containing the Job which is assigned to this hardware unit.
This error occurs, if the SpiMemoryModeSelection for Spi jobs value of the SpiJob short name of the value of the SpiSequence should be <TX_ONLY_MODE>, since the parameter SpiHighPriorityHwSequence in the SpiSequence container is configured as <true> for this sequence. Hence the MCAL Code Generator Tool ignores the value configured for the parameter SpiHighPriorityHwSequence for this sequence.

ERR_59_83_057: The parameter 'SpiHwUnitSynchronous' of Job2 should be 'ASYNCHRONOUS', since the parameter 'SpiHighPriorityHwSequence' in the SpiSequence container is configured as <true> for Sequence2 which is assigned with Job2.
This error will occur if value of the parameter SpiHwUnitSynchronous in the container ‘SpiJob’ is configured as ‘Synchronous’ where sequence is SpiHighPriorityHwSequence.

ERR_59_83_058: Jobs Job0 and Job1 must refer to the same external device container, since they are referring to the same CS line and the sequences containing these jobs are configured with 'SpiHighPriorityHwSequence' <true> For SpiDriver0.
This error occurs, if the chip select for the job is configured as Chip select value and this chip selects is associated with sequence which is having SpiHighPriorityHwSequence parameter is configured as true.

ERR_59_83_059: Parameter 'SpiHighPriorityHwSequence' in the sequence container of sequence$SeqCount is configured as <false> and 'SpiMemoryModeSelection' is configured as 'TX_ONLY_MODE' but the channel configured in SpiJob$JobCount is EB. In 'Tx-only mode', only high-priority sequences can have external buffers.
This error occurs, if the SpiMemoryModeSelection for Spi jobs value of the SpiJob short name of the value of the SpiSequence should be <TX_ONLY_MODE>, since the parameter SpiHighPriorityHwSequence in the SpiSequence container is configured as <true> for this sequence. Hence the MCAL

Code Generator Tool ignores the value configured for the parameter SpiHighPriorityHwSequence for this sequence.
Note: ie, Normal sequences for Tx-only mode should always have internal buffers.

ERR_59_83_060: SpiChannels '<SpiChannelID>' and '<SpiChannelID>' must have the same Data width and direction (LSB/MSB) , since they are having the same CS line and linked to <sequence> which is configured with 'SpiHighPriorityHwSequence' <true> For <SpiDriver>.
This error occurs, if the channels of the job is configured with sequence which is having SpiHighPriorityHwSequence parameter is configured as true should have same properties of SpiDataWidth and SpiTransferStart**.**

ERR_59_83_061: The chip select $PortPinSelect in SpiJob$JobCount is not supported for the Device $DeviceVariant.
This error occurs, if the value of the parameter SpiPortPinSelect in the container SpiJob is configured as Port group related pins and the parameter SpiCsSelection present in the container SpiExternalDevice is configured as CS_VIA_PERIPHERAL_ENGINE.

ERR_59_83_062: The DMA is configured as true and Data width is not configured as 16bits.
This error occurs, if the configured value of the parameter SpiDataWidthSelection in the container SpiGeneral is not equal to 16 and the SpiDmaMode parameter is configured as true.

ERR_59_83_063: The SpiMemoryMode is not configured.
This error occurs, if no memorymode is configured in configuration xml.

ERR_59_83_064: The SPI channel configured across jobs should not be repeated when the parameter ' SpiMemoryModeSelection' in the container ' SpiMemoryMode' is configured as <DUAL_BUFFER_MODE/ TX_ONLY_MODE>.
This error occurs, if the value of the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE and the channels configured for respective jobs are repeated.

ERR_59_83_065: The jobs configured for the parameter 'SpiJobAssignment' in the container ‘SpiSequence’ should not be repeated since the parameter ‘SpiMemoryModeSelection’ in the container ‘SpiMemoryMode’ is configured as <DUAL_BUFFER_MODE/TX_ONLY_MODE>.
This error will occur, if the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE or TX_ONLY_MODE and the jobs configured for the parameter SpiJobAssignment in the container SpiSequence is repeated.

ERR_59_83_066: The value of the parameter ‘SpiHwUnit’ in the container ‘SpiExternalDevice’ should be same when the parameter ‘SpiMemoryModeSelection’ in the container ‘SpiMemoryMode’ is configured as <value of the parameter SpiMemoryModeSelection> within a sequence.
This error will occur, if the value of the parameter SpiHwUnit in the container SpiExternalDevice is not same when the parameter SpiMemoryModeSelection in the container SpiMemoryMode is configured as DUAL_BUFFER_MODE and TX_ONLY_MODE within sequence.

ERR_59_83_067: The total number of buffers configured for all jobs linked to one CSIH HW Unit should be less than or equal to <64/128> since the value of the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <TX_ONLY_MODE> and the parameter 'SpiDataWidth' in the container 'SpiChannel' is configured as less than or equal to <16>.
This error will occur, if the total number of buffers configured for all jobs linked to one CSIH HW Unit is more than 64/128 when the value of the parameter SpiMemoryModeModeSelection in the container SpiMemoryModeMode is configured as TX_ONLY_MODE and the parameter SpiDataWidth in the container SpiChannel is configured as less than or equal to 16.

ERR_59_83_068 : The total number of buffers configured for all jobs linked to one CSIH HW Unit should be less than or equal to <32/64> since the value of the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <DUAL_BUFFER_MODE> and the parameter 'SpiDataWidth' in the container 'SpiChannel' is configured as greater than <16>.
This error will occur, if the total number of buffers configured for all jobs linked to one CSIH HW Unit is more than 32/64 when the value of the parameter SpiMemoryModeModeSelection in the container SpiMemoryModeMode is configured as DUAL_BUFFER_MODE and the parameter SpiDataWidth in the container SpiChannel is configured as greater than 16.

ERR_59_83_069: The value of the parameter 'SpiDataWidth' in the container 'SpiChannel' is not in the range of <2 to 32> since the value of the parameter 'SpiHwUnit' in the container 'SpiExternalDevice' is configured as CSIHn.
This error will occur, if the value of the parameter SpiDataWidth in the container SpiChannel is not in the range of 2 to 32 and the value of the parameter SpiHwUnit in the container SpiExternalDevice is configured as CSIH<n>. Here <n> is integer numbers e.g. 0, 1, 2 and 3.

ERR_59_83_070: The value configured for the parameter 'SpiDmaHwUnit' in the container 'SpiDma' should be configured in any of the hardware units selected for jobs.
This error will occur, if the value configured for the parameter SpiDmaHwUnit in the container SpiDma is not configured in any of the hardware units selected for jobs.

ERR_59_83_071: The parameter 'SpiHwUnit' present in the container 'SpiExternalDevice' is configured as <value of the parameter SpiHwUnit> and all of the following parameters (SpiCsIdleEnforcement, SpiCsIdleTiming, SpiCsHoldTiming, SpiCsInterDataDelay and SpiCsSetupTime) should be configured.
This error will occur, if the parameter SpiHwUnit present in the container SpiExternalDevice is configured as CSIH<m> and any of the parameters SpiCsIdleEnforcement, SpiCsIdleTiming, SpiCsHoldTiming, SpiCsInterDataDelay and SpiCsSetupTime is not configured. Here <m> is integer number e.g. 0, 1, 2 and 3.

ERR_59_83_072: The number of SPI sequences configured should be same across multiple configurations set container 'SpiDriver'.
This error will occur, if the numbers of SPI sequences configured are not same across the multiple configurations set container SpiDriver.

ERR_59_83_073: The number of SPI Jobs configured should be same across the multiple configurations set container 'SpiDriver'.
This error will occur, if the number of SPI jobs configured is not same across the multiple configurations set container SpiDriver.

ERR_59_83_074: The number of 'SpiExternalDevice' configured should be same across the multiple configurations set container ‘SpiDriver’.
This error will occur, if the number of SpiExternalDevice configured is not same across the multiple configurations set container SpiDriver.

ERR_59_83_075: The same value should be configured for the parameter ‘SpiHwUnit’ in the container 'SpiExternalDevice' across the multiple configuration sets.
This error will occur, if the value configured for the parameter SpiHwUnit in the container SpiExternalDevice is not same across multiple configuration sets.

ERR_59_83_076: The value configured for the parameter 'SpiSeqStartNotification' should follow C Syntax < [a-zA-Z] [a-zA-Z0-9_] >.
This error will occur, if the value of configuration parameters mentioned below does not adhere to C syntax i.e., the value should not contain characters other than (a-z, A-Z, 0-9 or “_”) and it also should start with an alphabet**.**

ERR_59_83_077: The parameter 'SpiSeqEndNotification' in the container 'SpiSequence' should not be configured, when the parameter 'SpiHwUnitSynchronous' in the container ‘SpiJob’ is configured with value 'SYNCHRONOUS' since the pre-compile parameter 'SpiSyncSeqEndNotificationEnable' in the 'SpiGeneral' container is configured as false.
The error will occur if value of the parameter SpiHwUnitSynchronous in the container ‘SpiJob’ is configured as ‘Synchronous’ , when the parameter ‘SpiSyncSeqEndNotificationEnable’ in SpiGeneral container is FALSE and the sequence to which the ‘SpiJob’ belongs has Sequence end notification configured.

ERR_59_83_078: The value of the parameter ‘SpiJobEndNotification’ configured in the container ‘SpiJob’ should be unique for jobs with hardware units of different memory modes.
This error will occur, if the parameter SpiJobEndNotification of the container SpiJob is not unique for jobs with hardware units of different memory modes**.**

ERR_59_83_079: The value of parameter 'SpiSeqEndNotification' present in the container 'SpiSequence' should be unique for the sequences having jobs with hardware units of different memory modes.
This error will occur, if the value of parameter SpiSeqEndNotification present in the container SpiSequence is not unique for the sequences having jobs with hardware units of different memory modes.

ERR_59_83_080: The parameter ‘SpiSeqEndNotification’ in the container ‘SpiSequence’ should be same for sequences having same 'SpiSequenceId' <value for SpiSequenceId> across multiple configurations set container ‘SpiDriver’.
This error will occur, if the parameter SpiSeqEndNotification in the container SpiSequence is not same for SPI Sequences (having same Sequence ID) across multiple configurations set container SpiSequence.

ERR_59_83_081: HW Unit $HwUnit is configured for multiple DMA container.
This error will occure, if multiple DMA container configured same hardware unit.

ERR_59_83_082: The number of 'SpiDMA' configured should be same across the multiple configurations set container ‘SpiDriver’.
This error will occur, if the number of SpiDMA configured is not same across the multiple configurations set container SpiDriver.

ERR_59_83_083: The value of parameter 'SpiSeqStartNotification'present in the container 'SpiSequence' should be unique for the sequences having jobs with hardware units of different memory modes.
This error will occur, if the value of parameter SpiSeqEndNotification present in the container SpiSequence is not unique for the sequences having jobs with hardware units of different memory modes.

ERR_59_83_084: The parameter 'SpiWriteVerifyErrorInterface' in the 'SpiGeneral' container should be configured when any of the parameters 'SpiCSIHWriteVerify' or 'SpiDMAWriteVerify' are configured as <WV_INIT_ONLY> or <WV_INIT_RUNTIME>.
This error will occur, if the value of parameter 'Spi_UseWriteVerifyErrorInterface' present in the general container is not configured when any one or both parameter 'SpiCSIHWriteVerify' and 'SpiDMAWriteVerify' are configured as <WV_INIT_ONLY> or <WV_INIT_RUNTIME>.

ERR_59_83_085: The parameter 'SpiWriteVerifyErrorInterface' in the 'SpiGeneral' container should be configured when the parameters 'Spi_UseWriteVerifyErrorInterface' is configured as 'true'.
This error will occur, if the value of parameter 'SpiWriteVerifyErrorInterface' present in the general container is not configured when parameter '' are configured as 'true'.

ERR_59_83_086: References 'SpiClockFrequencyRef' is not configured in <SpiExternalDevice>
This error will occur, if the value of parameter 'SpiClockFrequencyRef' present in the SpiExternalDevice container is not configured.

ERR_59_83_087: References path of Parameter 'SpiClockFrequencyRef' is not correct in <SpiExternalDevice>
This error will occur, if the value of parameter 'SpiClockFrequencyRef' present in the SpiExternalDevice container is not correct.

ERR_59_83_088: References SPI_E_LOOPBACK_SELFTEST_FAILURE is not configured in <PATH> when the parameter 'SpiLoopBackSelfTest' is configured as <LoopBack_Init> or <LoopBack_Init_RunTime> in 'SpiGeneral' container.
This error will occur, if the value of parameter 'SPI_E_LOOPBACK_SELFTEST_FAILURE' present in the SpiDemEventParameterRefs container is not configured when the parameter in general container 'SpiLoopBackSelfTest' is configured as <LoopBack_Init> or <LoopBack_Init_RunTime>.

ERR_59_83_089: References path of Parameter 'SPI_E_LOOPBACK_SELFTEST_FAILURE' is not correct in <SpiDemEventParameterRefs>
This error will occur, if the value of parameter 'SPI_E_LOOPBACK_SELFTEST_FAILURE' present in the SpiDemEventParameterRefs container is not correct.

ERR_59_83_090: References SPI_E_ECC_SELFTEST_FAILURE is not configured in <PATH> when the parameter 'SpiECCSelfTest' is configured as <ECC_Init> or <ECC_Init_RunTime> in 'SpiGeneral' container.
This error will occur, if the value of parameter 'SPI_E_ECC_SELFTEST_FAILURE' present in the SpiDemEventParameterRefs container is not configured when the parameter in general container 'SpiECCSelfTest' is configured as <ECC_Init> or <ECC_Init_RunTime>.

ERR_59_83_091: References path of Parameter 'SPI_E_ECC_SELFTEST_FAILURE' is not correct in <SpiDemEventParameterRefs>
This error will occur, if the value of parameter 'SPI_E_ECC_SELFTEST_FAILURE' present in the SpiDemEventParameterRefs container is not correct**.**

ERR_59_83_092: References SPI_E_INT_INCONSISTENT is not configured in <PATH> when the parameter 'SpiInterruptConsistencyCheck' is configured as <true> in 'SpiGeneral' container.
This error will occur, if the value of parameter 'SPI_E_INT_INCONSISTENT' present in the SpiDemEventParameterRefs container is not configured when the parameter in general container 'SpiInterruptConsistencyCheck' is configured as <true>.

ERR_59_83_093: References path of Parameter 'SPI_E_INT_INCONSISTENT' is not correct in <SpiDemEventParameterRefs>
This error will occur, if the value of parameter 'SPI_E_INT_INCONSISTENT' present in the SpiDemEventParameterRefs container is not correct.

ERR_59_83_094: References SPI_E_REG_WRITE_VERIFY is not configured in $Validate_Spi_SpiDemEventParameterRefsPath when any one of the parameter 'SpiCSIHWriteVerify' or 'SpiDMAWriteVerify' is configured as <WV_INIT_ONLY> or <WV_INIT_RUNTIME> in 'SpiGeneral' container.
This error will occur, if the value of parameter 'SPI_E_REG_WRITE_VERIFY' present in the SpiDemEventParameterRefs container is not configured when any one of the parameter in general container 'SpiCSIHWriteVerify' or 'SpiDMAWriteVerify' is configured as <WV_INIT_ONLY> or <WV_INIT_RUNTIME>.

ERR_59_83_095: References path of Parameter 'SPI_E_REG_WRITE_VERIFY' is not correct in <SpiDemEventParameterRefs>
This error will occur, if the value of parameter 'SPI_E_REG_WRITE_VERIFY' present in the SpiDemEventParameterRefs container is not correct.

ERR_59_83_096: The reference path configured for the parameters in the container 'SpiDemEventParameterRefs' should be unique.
This error will occur, if the parameter are configured with same dem path in container 'SpiDemEventParameterRefs'**.**

ERR_59_83_097: The value of the parameter 'parameter name' across the containers 'SpiExternalDevicex' and 'SpiExternalDevicey' should be same as they are referring the same SpiHw 'CSIHn'.
The error will occur if the value of the parameters SpiCsInactiveAfterLastData, SpiShiftClockIdleLevel, SpiInputClockSelect, SpiInterruptDelayMode in the SpiExternalDevice container are not same across the External devices mapped to the same SpiHw Unit**.**

ERR_59_83_098: The SPI channels configured for a specific job should be consecutive in order when the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <DUAL_BUFFER_MODE/TX_ONLY_MODE>.
This error will occur, The SPI channels configured for a specific job should be consecutive in order when the parameter 'SpiMemoryModeSelection' in the container 'SpiMemoryMode' is configured as <DUAL_BUFFER_MODE/TX_ONLY_MODE>.

ERR_59_83_099: The parameter SpiCsSelection is not configured as 'CS_VIA_PERIPHERAL_ENGINE' in the container SpiExternalDevice$Device since the CSIH hardware is used.
This error will occur if the parameter SpiCsSelection is not configured as 'CS_VIA_PERIPHERAL_ENGINE' in the container SpiExternalDevice since the chip select for CSIH HW units are always configured as hardware chip select pin.

ERR_59_83_100: The channel path configured for job '<JobName>' in driver set '<SpiDriverName>' is not correct.
This error will occur if the channel path configured for the job is wrong.

ERR_59_83_101: The device path configured for job '<JobName>' in driver set '<SpiDriverName>' is not correct.
This error will occur if the device path configured for the job is wrong.

ERR_59_83_102: The Hardware unit '<HWUnit>' configured for job '<JobName>' in driver set '<SpiDriverName>' is not mapped to any one of memory modes.
This error will occur if the hard ware unit configured for the job is not assigned to any memory modes.

ERR_59_83_103: The job path configured for sequence '<SeqName>' in driver set '<SpiDriverName>' is not correct.
This error will occur if the job path configured for the sequence is not correct.

ERR_59_83_104: Selected unsupported device variant in 'SpiDeviceName'.
This error will occur if the device name given in parameter 'SpiDeviceName' of arxml is wrong or unsupported.

ERR_59_83_105: The HW unit '<HW>' in SpiMemoryMode container '<Spi_Mode_Name>' is not assigned to any SpiExternalDevice container.
This error will occur if the HW unit in SpiMemoryMode container is not assigned to any SpiExternalDevice container.

ERR_59_83_106: The value for 'SpiDmaMode' in General container should be configured as <false> since the value of parameter 'SpiLevelDelivered' is configured as <0>.
This error will occur if the general container parameters, SpiDmaMode configured as true and SpiLevelDelivered configured as zero. In synchronous data transfer DMA mode is not possible.

ERR_59_83_107: The value configured for 'SpiBaudrateConfiguration' in <SpiDevName> container should be greater than Zero.

This error will occur if the value configured for SpiBaudrateConfiguration in SpiExternalDevice container was not greater than zero. This parameter is used for baud rate calculation.

ERR_59_83_108: The configured baud rate value of <SpiJobName> should be between <CLKP_C / 524160> and <CLKP_C / 4>.
This error will occur if the calculated baud rate was not in the range of expected baud rate with respect to MCU clock.

ERR_59_83_109: The parameters 'SpiInputClockSelect' and 'SpiBaudrateConfiguration' should be configured in such a way that the calculated Baud rate should be less than <CLKP_C / 4> in <SpiJobName>.
This error will occur if the value configured for SpiInputClockSelect and SpiBaudrateConfiguration in container SpiExternalDevice was not correct to obtain minimum baud rate.

ERR_59_83_110: The value of 'SpiHwUnitSynchronous' in job container should not be configured as <'SYNCHRONOUS' / 'ASYNCHRONOUS'> if the value configured for 'SpiLevelDelivered' is <'1'/ '0'> in General container.
This error will occur if the values configured for SpiLevelDelivered and SpiHwUnitSynchronous were mismatching**.**

ERR_59_83_111: The different CS polarity configured for <CSL pin> of <CSIHHW> in <SpiDrivName>.
This error will occur if CS polarity configured was not same for same CSL pin of CSIH device**.**

9.2 Warning Messages

None.

9.3 Information Messages

This section contains the list of information messages that will be generated by the MCAL Code Generator Tool.

INFO_59_83_001: The parameter 'SpiHighPriorityHwSequence' in the container 'SpiSequence ' not to be configured as <true>. Since the pre-compile parameter 'SpiHighPriorityHwHandlingEnable' in the 'SpiGeneral' container is configured as <false>. Hence the MCAL Code Generator Tool ignores the value configured for the parameter 'SpiHighPriorityHwSequence'.
This warning occurs, if the value of the parameter SpiHighPriorityHwSequence configured in the container SpiSequence is not to be configured as true. And the parameter SpiHighPriorityHwHandlingEnable in the container SpiGeneral should be false. On that moment MCAL Code Generator Tool ignores the value configured for the parameter SpiHighPriorityHwSequence.

INFO_59_83_002: Calculated SPI baudrate for job 'SpiJob' in configuration set 'SpiDriver' should be equal to <Calculated Buadrate Hz>.
This information will occur to provide the calculated SPI baudrate for job (SpiJob) in configuration set SpiDriver.

The calculation of baudrate is done as follows:
Baudrate = (Referred peripheral clock form MCU) / [(2m) * SpiBaudrateConfiguration * 2]

Table 9-3 Parameter values related to INF0_59_83_002

SpiInputClockSelect	m
PCLK	0
PCLK_DIVBY_2	1
PCLK_DIVBY_4	2
PCLK_DIVBY_8	3
PCLK_DIVBY_16	4
PCLK_DIVBY_32	5
PCLK_DIVBY_64	6

INFO_59_83_003: The expected CS behavior may not be observed at high baud rates in case of Direct Access Mode due to general limitation of the serial controllers. A work around at high baud rates is to use FIFO mode.

This information occurs whenever Direct Access Mode is configured to notify the user that, at chip select behavior may not be as expected at higher baud rate in Direct Access Mode.

Revision History

Sl.No.	Description	Version	Date
1.	Initial Version	1.0.0	05-Aug-2015
2.	Following changes are made: 1. In section 10.1.1, error message regarding 16 bit data width selection is added when DMA is configured. 2. The section List of tables updated. 3. In Section 10, descriptions added for error, warning and information messages.	1.0.1	28-Mar-2016
3.	Following changes are made: 1. Introduction updated in section 1. 2. Updated Chapters 1,3,4,5,6,7 by rephrasing Tool and SPI Driver Generation Tool with MCAL Code Generator Tool 3. Precaution and remark updated in section 6. 4. User Configuration Validation information updated in section 7. 5. Notes updated in section 11. 6. Remarks added in section 3. 7. Table header name updated in Table 8.1 and Table 8.2. 8. Removed Section 9.1 Common Messages. 9. Error messages and information messages updated in the section 9.1 and 9.3. 10. Removed Chapter 9 SPI Driver Generation Tool Options, Chapter-11 Notes. 11. Chapter 3, Added remark for common MCAL Code Generator Tool user manual. 12. Chapter 3, Updated Figure 3-2 Flowchart of MCAL Code Generator Tool. 13. Chapter 3, Renamed chapter name MCAL Code Generator Tool Overview to Code Generation Overview. 14. Removed parameters from Figure 8-1, Configuration Overview.	1.0.2	27-Jan-2017

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Renesas Electronics America Inc.
2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL II Stage, Indiranagar, Bangalore, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

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