Product	XMC Libraries (XMC Lib)
Release Version	V2.1.16
Type Of Release*	Productive
Name of the Supplier	Infineon Technologies AG
Mode of Release	Infineon Server(http://dave.infineon.com/)
Date of Release	2017-08-07
Previous Version	V2.1.12

Contents

1 Released Items 2

2 Support Packages 4

3 Tool Information 5

4 Changes from Previous Version 6

5 Installation Requirements 8

6 Known Limitations 9

7 XMC Libs Revision History 10

* All types of releases -med as Alpha, Beta, Release Candidate and Patch are not intended to be used for production code.

1 Released Items

1.1 XMC Libraries (XMC Lib)

This XMC Lib package contains the following **31** peripheral drivers which supports XMC4000 and XMC1000 family microcontrollers.

No	XMC Libs	XMC48	XMC47	XMC45	XMC44	XMC43	XMC42	XMC41	XMC14	XMC13	XMC12	XMC11
1	ACMP	-	-	-	-	-	-	-	✓	✓	✓	-
2	BCCU	-	-	-	-	-	-	-	✓	✓	✓	-
3	CAN	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
4	CCU4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	CCU8	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
6	DAC	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
7	DMA	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
8	DSD	✓	✓	✓	✓	-	✓	✓	-	-	-	-
9	EBU	✓	✓	✓	-	-	-	-	-	-	-	-
10	ECAT	✓	-	-	-	✓	-	-	-	-	-	-
11	ERU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	ETH	✓	✓	✓	✓	✓			-	-	-	-
13	FCE	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
14	FLASH	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	GPIO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	HRPWM	-	-	-	✓	-	✓	✓	-	-	-	-
17	I2C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	I2S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19	LEDTS	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-
20	MATH	-	-	-	-	-	-	-	✓	✓	-	-
21	PAU	-	-	-	-	-	-	-	✓	✓	✓	✓
22	POSIF	✓	✓	✓	✓	-	✓	✓	✓	✓	-	-
23	PRNG	-	-	-	-	-	-	-	✓	✓	✓	✓
24	RTC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	SCU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	SDMMC	✓	✓	✓	-	✓	-	-	-	-	-	-
27	SPI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	UART	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	USBD	✓	✓	✓	✓	✓	✓	✓	-	-	-	-

30	USBH	✓	✓	✓	✓	✓	-	-	-	-	-	-
31	VADC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32	WDT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1.2 XMC Lib - Test conditions

- Libraries for the XMC4800 series are verified on all supported derivatives; fully functional test is applied with XMC4800-F144x1024.
- Libraries for the XMC4500 series are verified on all supported derivatives; fully functional test is applied with XMC4500-F144x1024.
- Libraries for the XMC4400 series are verified on all supported derivatives; fully functional test is applied with XMC4400-F100x512.
- Libraries for the XMC4300 series are verified on all supported derivatives; fully functional test is applied with XMC4300-F100x256.
- Libraries for the XMC4200 series are verified on all supported derivatives; fully functional l test is applied with XMC4200-Q48x256.
- Libraries for the XMC1100 series are verified on all supported derivatives; fully functional test is applied with XMC1100-T038F0064.
- Libraries for the XMC1200 series are verified on all supported derivatives; fully functional test is applied with XMC1200-T038F0200.
- Libraries for the XMC1300 series are verified on all supported derivatives; fully functional test is applied with XMC1302-T038F0200.
- Libraries for the XMC1400 series are verified on all supported derivatives; fully functional test is applied with XMC1404Q064x0128.

- Compilers used :
  - KEIL: V5.10.0.2
  - IAR: V6.50.6.4958
  - GCC compiler version ARM-GCC-49

2 Support Packages

None

3 Tool Information

XMC Lib	XMC Libraries are provided as tool agnostic package
KEIL MDK CMSIS PACK	XMC Libraries are bundled with CMSIS PACK for Keil MDK
DAVE	XMC Libraries are bundled with DAVE Librarystore.

4 Changes from Previous Version

4.1 V2.1.16: changes from previous version 2.1.12

Sl.no	Description of change
1	10 XMC Libs are updated Common, CCU8, CCU4, SCU_XMC1, SCU_XMC4, VADC, POSIF, ETH_MAC, ECAT, EBU, Please refer the XMC Lib revision history for details. All changes are fully compatible to the previous version

4.2 V2.1.12: changes from previous version 2.1.10

Sl.no	Description of change
1	3 XMC Libs are updated SCU_XMC1, ETH_MAC, XMC_MATH Please refer the XMC Lib revision history for details. All changes are fully compatible to the previous version

4.3 V2.1.10: changes from previous version 2.1.8

Sl.no	Description of change
1	5 XMC Libs are updated VADC, SCU_XMC1, ETH_MAC, ERU, DMA Please refer the XMC Lib revision history for details. All changes are fully compatible to the previous version

4.4 V2.1.8: Changes from previous version v2.1.6

Sl.no	Description of change
1	1 New XMC Libs are added – USBH
2	15 XMC Libs are updated. Please refer the XMC Libs revision history for details.

4.5 V2.1.6: Changes from previous version v2.1.4

Sl.no	Description of change
1	11 XMC Libs are updated. Please refer the XMC Libs revision history for details (in chapter 7).

4.6 Changes from previous version v2.1.2

Sl.no	Description of change
1	1 New XMC Libs are added – ECAT
2	6 XMC Libs are updated. Please refer the XMC Libs revision history for details.

4.7 Changes from previous version v2.0.0

Sl.no	Description of change
1	1 New XMC Libs are added – I2S
2	12 XMC Libs are updated. Please refer the XMC Libs revision history for details.

4.8 Changes from previous version v1.0.0

Sl.no	Description of change
1	2 New XMC Libs are added – ETH and DSD.
2	15 XMC Libs are updated. Please refer the XMC Libs revision history for details.

5 Installation Requirements

- DAVE v4.1.2 or higher version should be installed or use any other compiler tool chain supporting Infineon Technologies XMC Microcontrollers, e.g. Atollic, IAR, Keil MDK, Rowley, TASKING.

6 Known Limitations

XMC Lib	Limitation / Deviation
SDMMC	SDMMC driver tested with an SD card. , It wasn't tested with an MMC card (but it is expected that it works fine on MMC interface)
USBH (USB Host)	Host mode DMA operations are not supported.
USIC-I2S	Channel identification whether left or right using RBUFSR is not happening. Alternatively, user shall use the bit fields of DX2CR.DX2S, PSR.WA [IIS Mode] to identify the channel for Slave and Master respectively.
CCU	In XMC1400 devices, automatic shadow transfer feature is not supported with double module clock frequency (2MCLK).
ALL	When using Tasking compiler – recommended to use version 5.1r1 and above

7 XMC Libs Revision History

7.1 XMC Libs revision history from version v2.1.10

The XMC Lib version 2.1.12 is fully backward compatible to XMC Lib version 2.1.10

XMC Lib	Revision History
ETH_MAC	Fixed: • XMC_ETH_MAC_InitPTP() fixed initialization • XMC_ETH_MAC_UpdatePTPTime(), XMC_ETH_MAC_SetPTPAlarm() fixed nanoseconds initialization • Ordering of PTP nanoseconds and seconds members in XMC_ETH_MAC_DMA_DESC_t structure corrected Changed: • XMC_ETH_MAC_Init() to disable PMT and timestamp interrupt events and MMC IPC receive interrupt events • XMC_ETH_MAC_AdjustPTPClock(), it modifies directly the addend register • XMC_ETH_MAC_InitPTP() adding a new parameter to set the time Added API: • XMC_ETH_MAC_SetPTPTime() to set the system time • XMC_ETH_MAC_InitPTPEx(), extension to XMC_ETH_MAC_InitPTP() adding a new parameter to set the time • XMC_ETH_MAC_UpdateAddend() to directly write to the addend register • XMC_ETH_MAC_EnablePTPAlarm() and XMC_ETH_MAC_DisablePTPAlarm
SCU_XMC1	Fixed: • XMC_SCU_CLOCK_EnableDCO1ExtRefCalibration() prescaler equation
XMC_MATH	Fixed: • Forward declaration of __eabi_* functions to fix link time optimization (-flto) compilation errors

7.2 XMC Libs revision history from version v2.1.8

The XMC Lib version 2.1.10 is fully backward compatible to XMC Lib version 2.1.8
For details of changes refer to the revision history in the XMC Lib zip package or DAVE Help content.

XMC Lib	Revision History
DMA	Fixed: • Documentation on maximum block size
ERU	Fixed: • Remove incorrect ERU0_ETL1_INPUTB_P0_1 and replace it by ERU0_ETL1_INPUTB_SCU_HIB_SR1
ETH_MAC	Changed: • XMC_ETH_MAC_Init() to optimize access to bus
SCU_XMC1	Fixed:

	• Issue reading oscillator watchdog status
VADC	Added: • new functions to remove channels from background request source, XMC_VADC_GLOBAL_BackgroundRemoveChannelFromSequence() and XMC_VADC_GLOBAL_BackgndRemoveMultipleChannels() • New macros equivalent to the existing ones but with better naming. (Old macros are kept for backward compatibility but they deprecated) • ECAT support for XMC48/43 • missing support for XMC4700 Fix : • assertion in XMC_VADC_GROUP_CheckSlaveReadiness() and XMC_VADC_GROUP_IgnoreSlaveReadiness() checking the slave_group parameter Renamed: • XMC_CCU_41_ST2 to XMC_CCU_41_ST3

7.3 XMC Libs revision history from version v2.1.6

The XMC Lib version 2.1.8 is fully backward compatible to XMC Lib version 2.1.6

XMC Lib	Revision History
VADC	• Added: Macro added for SHS differentiation, result register assignment configurations, and synchronous separation. ○ XMC_VADC_SHS_FULL_SET_REG, XMC_VADC_RESULT_PRIORITY_AVAILABLE, XMC_VADC_SYNCTR_START_LOCATION Enumerations added ○ XMC_VADC_SHS_GAIN_LEVEL_t ○ XMC_VADC_SYNCTR_EVAL_t New APIs added: ○ XMC_VADC_GROUP_SetSyncSlaveReadySignal() ○ XMC_VADC_GROUP_ChannelGetAssertedEvents() ○ XMC_VADC_GROUP_GetAssertedResultEvents() ○ XMC_VADC_GROUP_SetResultRegPriority() ○ XMC_VADC_GROUP_SetSyncReadySignal() ○ XMC_VADC_GROUP_GetSyncReadySignal() ○ XMC_VADC_GROUP_GetResultRegPriority() • Fixed: ○ XMC_VADC_GROUP_CheckSlaveReadiness(), XMC_VADC_GROUP_IgnoreSlaveReadiness() APIs fixed for the EVAL configuration for synchronous READY signal connections.
USIC	• Added: ○ Add missing USIC2_C1_DX0_P4_6,USIC1_C0_DX0_P1_14, USIC2_C0_DX0_P6_5, USIC2_C0_DX0_P9_4, USIC2_C1_DX1_P9_9, USIC2_C1_DX2_P9_8 for XMC47/48 BGA196 ○ Add missing USIC2_C1_DX0_P4_6, USIC1_C0_DX0_P1_14 for XMC47/48 LQFP100 ○ Add missing USIC2_C1_DX0_P4_6, USIC1_C0_DX0_P1_14, USIC2_C0_DX0_P6_5 for XMC47/48 LQFP144 • USIC (Added missed connections): xmc1_usic_map.h and xmc4_usic_map.h updated ○ For XMC47/XMC48 ▪ 1. U1C0: dx0e -> 1.14 ▪ 2. U2C0: dx0d -> 6.5 ▪ 3. U2C0: dx0e -> 9.4 ▪ 4. U2C1: dx2c -> 9.8 ▪ 5. U2C1: dx1c -> 9.9 ○ For XMC14: ▪ 1. U1C0: dout0 -> 1.5 ▪ 2. U1C0:dx1e -> 3.4

	•
UART	• Added: ○ XMC_UART_CH_EnableDataTransmission(), XMC_UART_CH_DisableDataTransmission() • Changed: ○ XMC_UART_CH_Init() Enable transfer status BUSY ○ XMC_UART_CH_Stop() Check for transfer status
SPI	• Added: ○ XMC_SPI_CH_EnableDataTransmission(), XMC_SPI_CH_DisableDataTransmission()
SDMMC	• Fixed: ○ XMC_SDMMC_SetBusVoltage(), XMC_SDMMC_SetDataLineTimeout(), XMC_SDMMC_SDClockFreqSelect() Fixed wrong masking when accessing register ○ XMC_SDMMC_SetDataTransferMode() Avoid calling SetDateLineTimeout()
SCU	• Added: ○ XMC_SCU_CLOCK_IsLowPowerOscillatorStable(), XMC_SCU_CLOCK_IsHighPerformanceOscillatorStable() ○ XMC_SCU_POWER_WaitForInterrupt(), XMC_SCU_POWER_WaitForEvent() ○ XMC_SCU_CLOCK_EnableLowPowerOscillatorGeneralPurposeInput(), XMC_SCU_CLOCK_DisableLowPowerOscillatorGeneralPurposeInput(), XMC_SCU_CLOCK_GetLowPowerOscillatorGeneralPurposeInputStatus() ○ XMC_SCU_CLOCK_EnableHighPerformanceOscillatorGeneralPurposeInput(), XMC_SCU_CLOCK_DisableHighPerformanceOscillatorGeneralPurposeInput(), XMC_SCU_CLOCK_GetHighPerformanceOscillatorGeneralPurposeInputStatus() ○ XMC_SCU_HIB_IsWakeupEventDetected(), XMC_SCU_HIB_ClearWakeupEventDetectionStatus() ○ XMC_SCU_HIB_EnterHibernateStateEx() ○ Extended wakeup hibernate events using LPAC wakeup on events. Only available in XMC44, XMC42 and XMC41 series ○ Added LPAC APIs. Only available in XMC44, XMC42 and XMC41 series • Removed: ○ XMC_SCU_INTERRUPT_EVENT_OSCULSTAT_UPDATED, XMC_SCU_INTERRUPT_EVENT_HDSTAT_UPDATED
RTC	• Added: ○ XMC_RTC_SetTimeStdFormat(), XMC_RTC_SetAlarmStdFormat()
I2S	• Added: ○ XMC_I2S_CH_EnableDataTransmission(), XMC_I2S_CH_DisableDataTransmission() • Changed: ○ XMC_I2S_CH_Init() Change default passive level to 0 Call XMC_I2S_CH_SetSystemWordLength() to set the system frame length equal to the frame length. ○ XMC_I2S_CH_SetBaudrate() Optional Master clock output signal generated with a fixed phase relation to SCLK

I2C	• Added: ○ XMC_I2C_CH_EnableDataTransmission(), XMC_I2C_CH_DisableDataTransmission()
ETH_MAC	• Added: ○ XMC_ETH_MAC_GetTxBuffer(), XMC_ETH_MAC_GetRxBuffer() ○ XMC_ETH_MAC_SetTxBufferSize() ○ XMC_ETH_MAC_IsRxDescriptorOwnedByDma() • Changed: ○ XMC_ETH_MAC_ReturnTxDescriptor(), XMC_ETH_MAC_ReturnRxDescriptor() Update current descriptor pointer ○ XMC_ETH_MAC_Init() changed to disable MMC interrupt events.
ECAT	• Added: ○ Macro map file added XMC_ECAT_PORT_CTRL_LATCHIN0_P9_0 and XMC_ECAT_PORT_CTRL_LATCHIN0_P9_1
GPIO	• Added: ○ Added P2_0_AF_CAN_N0_TXD for XMC4300
CCU8	• Added: ○ XMC_CCU8_SLICE_StopClearTimer() • Changed: ○ XMC_CCU8_SLICE_StopTimer(), XMC_CCU4_SLICE_ClearTimer() Avoid read write modify access
CCU4	• Added: ○ XMC_CCU4_SLICE_StopClearTimer() • Changed: ○ XMC_CCU4_SLICE_StopTimer(), XMC_CCU4_SLICE_ClearTimer() Avoid read write modify access
CAN	• Added: ○ XMC_CAN_IsPanelControlReady() • Changed: ○ XMC_CAN_AllocateMOtoNodeList() Wait for ready status of list controller • Fixed: ○ XMC_CAN_MO_Config() Solve issue with TX and RX interrupt node pointers being cleared. • CAN (Added missed connections): xmc_can_map.h map file updated ○ For XMC43; can node 0, tx pin 2.0
xmc_device.h Map files	Device support: The following new devices are supported: 1. XMC1201_T028x0016 2. XMC1201_T028x0032 3. XMC1202_T016x0064 4. XMC1301_T016x0032 5. XMC1302_Q040x0200 6. XMC1302_T028x0016 7. XMC1402_T038x0032 8. XMC1402_T038x0064 9. XMC1402_T038x0128 10. XMC1402_T038x0200 11. XMC1402_Q040x0200 12. XMC1402_Q048x0200 13. XMC1403_Q040x0064 14. XMC1403_Q040x0128 15. XMC1403_Q040x0200

7.4 XMC Libs revision history from version v2.1.4

The XMC Lib version 2.1.6 is fully backward compatible to XMC Lib version 2.1.4

XMC Lib	Revision History
CCU8	❖ Fixed: - Use correct API implementation for XMC43, XMC47/48 devices ❖ Changed: - XMC_CCU8_EnableShadowTransfer() Optimization of write only registers
CCU8	❖ Fixed: - Use correct API implementation for XMC43, XMC47/48 devices ❖ Changed: - XMC_CCU8_EnableShadowTransfer() Optimization of write only registers
DMA	❖ Fixed: - XMC_DMA_IRQHandler() Clear channel event status before processing the event handler. It corrects event losses if the DMA triggered in the event handler finished before returning from handler. ❖ Changed: - XMC_DMA_CH_EnableEvent(), XMC_DMA_CH_DisableEvent() Optimization of write only registers - XMC_DMA_ClearOverrunStatus() Optimization of write only registers
EBU	❖ Fixed: - XMC_EBU_BUS_READ_CONFIG_t: Added missing ebu_data_hold_cycles_for_read_accesses - XMC_EBU_BUS_WRITE_CONFIG_t Added missing ebu_device_addressing_mode and ebu_data_hold_cycles_for_write_accesses
ERU	❖ Added: - XMC_ERU_ETL_GetEdgeDetection()
ETH_MAC	❖ Fixed: - XMC_ETH_MAC_DisableEvent() Fixed functionality
POSIF	❖ Changed: - XMC_POSIF_Start(), XMC_POSIF_Stop() Optimization of write only registers - XMC_POSIF_HSC_UpdateHallPattern(): Optimization of write only registers - XMC_POSIF_SetEvent(), XMC_POSIF_ClearEvent() Optimization of write only registers
RTC	❖ Changed: - XMC_RTC_ClearEvent() Optimization of write only registers

SCU	❖ Added: XMC_SCU_POWER_EnableMonitor(), XMC_SCU_POWER_DisableMonitor(), XMC_SCU_POWER_GetEVRStatus(), XMC_SCU_POWER_GetEVR13Voltage(), XMC_SCU_POWER_GetEVR33Voltage(), XMC_SCU_HIB_SetPinMode(), XMC_SCU_HIB_GetHibernateControlStatus(), XMC_SCU_HIB_GetEventStatus(), XMC_SCU_HIB_ClearEventStatus(), XMC_SCU_HIB_TriggerEvent(), XMC_SCU_HIB_EnableEvent(), XMC_SCU_HIB_DisableEvent() XMC_SCU_HIB_SetWakeupTriggerInput(), XMC_SCU_HIB_SetPinMode() XMC_SCU_HIB_SetOutputPinLevel(), XMC_SCU_HIB_SetInput0() XMC_SCU_HIB_EnterHibernateState() ❖ Fixed: - XMC_SCU_ReadFromRetentionMemory() Fix functionality - XMC_SCU_CLOCK_ScaleMCLKFrequency() It solves issues with down clock frequency scaling * - XMC_SCU_CLOCK_Init() for XMC1400 It solves issues when trying to disable the OSCHP and use the XTAL pins as GPIO ❖ Changed: Optimization of write only registers: XMC_SCU_INTERRUPT_ClearEventStatus(), XMC_SCU_TRAP_Trigger(), XMC_SCU_TRAP_ClearStatus(), XMC_SCU_RESET_AssertPeripheralReset(), XMC_SCU_RESET_DeassertPeripheralReset() XMC_SCU_CLOCK_GatePeripheralClock(), XMC_SCU_CLOCK_UngatePeripheralClock() XMC_SCU_POWER_EnableUsb(), XMC_SCU_POWER_DisableUsb() XMC_SCU_HIB_EnableHibernateDomain(), XMC_SCU_HIB_DisableHibernateDomain() XMC_SCU_RESET_ClearDeviceResetReason
SDMMC	❖ Changed: - XMC_SDMMC_ClearEvent() Optimization of write only registers ❖ Added: - XMC_SDMMC_COMMAND_RESPONSE_t
USIC	❖ Added: - XMC_USIC_CH_TXFIFO_PutDataHPCMode() ❖ Changed: - XMC_USIC_CH_TriggerServiceRequest() Optimization of write only registers - XMC_USIC_CH_TXFIFO_Flush(), XMC_USIC_CH_RXFIFO_Flush() Optimization of write only registers - XMC_USIC_CH_TXFIFO_ClearEvent(), XMC_USIC_CH_RXFIFO_ClearEvent() Optimization of write only registers

7.5 XMC Libs revision history from version v2.1.2

The XMC Lib version 2.1.4 is fully backward compatible to XMC Lib version 2.1.2

XMC Lib	Revision History
ETH_MAC	XMC_ETH_MAC_GetRxFrameSize return value in case of errors
ETH_PHY	❖ New APIs Added: XMC_ETH_PHY_ExitPowerDown(), XMC_ETH_PHY_Reset()
VADC	XMC_VADC_GLOBAL_TriggerEvent API fixed. OR operation removed.XMC_VADC_GLOBAL_ClearEvent API fixed. Multiple events triggering on clearing the event is fixed. Wrong MACRO name defined in xmc_vadc_map.h file corrected for XMC4200/4100 devices. XMC_VADC_G3_SAMPLE renamed to XMC_VADC_G1_SAMPLE.
FLASH	Fixed: Flash access time Wait until operation is finished for the next functions: XMC_FLASH_InstallProtection XMC_FLASH_ConfirmProtection XMC_FLASH_ProgramPage XMC_FLASH_EraseSector XMC_FLASH_ErasePhysicalSector XMC_FLASH_EraseUCB Fixed: XMC_FLASH_VerifyReadProtection and XMC_FLASH_VerifyWriteProtection
SDMMC	❖ New APIs Added: XMC_SDMMC_EnableDelayCmdDatLines(), XMC_SDMMC_DisableDelayCmdDatLines(), XMC_SDMMC_SetDelay(), XMC_SDMMC_EnableHighSpeed(), XMC_SDMMC_DisableHighSpeed()
SPI	❖ New APIs Added: XMC_SPI_CH_EnableSlaveSelectCodedMode() and XMC_SPI_CH_DisableSlaveSelectCodedMode()

7.6 XMC Libs revision history from version v2.0.0

The XMC Lib version 2.1.2 is fully backward compatible to XMC Lib version 2.0.0

XMC Lib	Revision History
CAN	❖ New APIs Added: 1. For MultiCAN plus: XMC_CAN_GetBaudrateClockFrequency(), XMC_CAN_Init(), XMC_CAN_SetBaudrateClockSource(), XMC_CAN_GetBaudrateClockSource(),
CCU8	Structure updates: 1. selector_out0, selector_out1, selector_out2, selector_out3are added to support the XMC14 device. Enums added: 2. XMC_CCU8_SLICE_PRESCALER_t is added to help while setting the prescaler value. 3. XMC_CCU8_SLICE_MULTI_IRQ_ID_t is added to support the multi event setting APIs XMC_CCU8_SLICE_E-bleMultipleEvents(),XMC_CCU8_SLICE_DisableEvent() 4. XMC_CCU8_SLICE_SHADOW_TRANSFER_MODE_t added to support the newly added APIs XMC_CCU8_SLICE_SetShadowTransferMode() 5. XMC_CCU8_SLICE_WRITE_INTO_t is added to support the APIs XMC_CCU8_SLICE_WriteCoherentlyWithPWMCycle(),XMC_CCU8_SLICE_WriteImmediateAfterShadowTransfer(). 6. XMC_CCU8_SLICE_AUTOMAIC_SHADOW_TRANSFER_WRITE_INTO_t is added to support XMC_CCU8_SLICE_E-

	bleAutomaticShadowTransferRequest(),XMC_CCU8_SLICE_DisableAutomaticShadowTransferRequest() 7. XMC_CCU8_SOURCE_OUT0_t, XMC_CCU8_SOURCE_OUT1_t, XMC_CCU8_SOURCE_OUT2_t, XMC_CCU8_SOURCE_OUT3_t are added to configure the selector_out0, selector_out1, selector_out2, selector_out3 parameters in the config structure. Enums updated: 1. XMC_CCU8_SLICE_EVENT_LEVEL_SENSITIVITY_t, two new items are added to support while configuring the external count direction control setting. 2. XMC_CCU8_OUT_PATH_t is updated enhance the support of XMC_CCU8_SLICE_SetOutPath () API for XMC14 device. New APIs Added: 1. XMC_CCU8_SLICE_E-bleCascadedShadowTransfer() 2. XMC_CCU8_SLICE_DisableCascadedShadowTransfer() 3. XMC_CCU8_SLICE_SetShadowTransferMode() 4. XMC_CCU8_SLICE_WriteCoherentlyWithPWMCycle() 5. XMC_CCU8_SLICE_WriteImmediateAfterShadowTransfer() 6. XMC_CCU8_SLICE_E-bleAutomaticShadowTransferRequest() 7. XMC_CCU8_SLICE_DisableAutomaticShadowTransferRequest() 8. XMC_CCU8_SLICE_SetTimerCompareMatchChannel1 (), XMC_CCU8_SLICE_SetTimerCompareMatchChannel2 () inline APIs are added to update the respective compare registers directly. APIs Updated: 1. XMC_CCU8_SLICE_ConfigureStatusBitOverrideEvent() updated to support the XMC14 device 2. XMC_CCU8_EnableShadowTransfer() is made as inline. 3. XMC_CCU8_SLICE_EnableMultipleEvents(),XMC_CCU4_SLICE_DisableEvent() input enum is changed. 4. XMC_CCU8_StartPrescaler() is invoked in XMC_CCU4_Init() API 5. XMC_CCU8_SLICE_GetEvent() is made as inline
CCU4	Structure updates: None Enums added: 1. XMC_CCU4_SLICE_PRESCALER_t is added to help while setting the prescaler value. 2. XMC_CCU4_SLICE_MULTI_IRQ_ID_t is added to support the multi event setting APIs XMC_CCU4_SLICE_E-bleMultipleEvents(),XMC_CCU4_SLICE_DisableEvent() 3. XMC_CCU4_SLICE_SHADOW_TRANSFER_MODE_t added to support the newly added APIs XMC_CCU4_SLICE_SetShadowTransferMode() 4. XMC_CCU4_SLICE_WRITE_INTO_t is added to support the APIs XMC_CCU4_SLICE_WriteCoherentlyWithPWMCycle(),XMC_CCU4_SLICE_WriteImmediateAfterShadowTransfer(). 5. XMC_CCU4_SLICE_AUTOMAIC_SHADOW_TRANSFER_WRITE_INTO_t is added to support XMC_CCU4_SLICE_E-bleAutomaticShadowTransferRequest(),XMC_CCU4_SLICE_DisableAutomaticShadowTransferRequest() Enums updated: 1. XMC_CCU4_SLICE_EVENT_LEVEL_SENSITIVITY_t, two new items are added to support while configuring the external count direction control setting. New APIs Added: (to support the XMC14 device) 1. XMC_CCU4_SLICE_E-bleCascadedShadowTransfer()

	2. XMC_CCU4_SLICE_DisableCascadedShadowTransfer() 3. XMC_CCU4_SLICE_SetShadowTransferMode() 4. XMC_CCU4_SLICE_WriteCoherentlyWithPWMCycle() 5. XMC_CCU4_SLICE_WriteImmediateAfterShadowTransfer() 6. XMC_CCU4_SLICE_E-bleAutomaticShadowTransferRequest() 7. XMC_CCU4_SLICE_DisableAutomaticShadowTransferRequest() APIs Updated: 1. XMC_CCU4_SLICE_ConfigureStatusBitOverrideEvent() updated to support the XMC14 device 2. XMC_CCU4_EnableShadowTransfer() is made as inline. 3. XMC_CCU4_SLICE_EnableMultipleEvents(),XMC_CCU4_SLICE_DisableEvent() input enum is changed. 4. XMC_CCU4_StartPrescaler() is invoked in XMC_CCU4_Init() API 5. XMC_CCU4_SLICE_GetEvent() is made as inline
MATH	❖ XMC_MATH_ClearEvent() API is updated to set the event clear flag bit. ❖ Added SQRT functions. ❖ Calculations of trigonometric functions for negative angles are corrected.
I2C	❖ Added new APIs: 1. For external input for BRG configuration:XMC_I2C_CH_ConfigExter-lInputSig-lToBRG() 2. For e-bling or disabling the ACK response to a 0x00 slave address: XMC_I2C_CH_EnableAcknowledgeAddress0() and XMC_I2C_CH_DisableAcknowledgeAddress0(). ❖ Modified APIs: 1. XMC_I2C_CH_SetInputSource() API for avoiding complete DXCR register overwriting. 2. XMC_I2C_CH_EVENT_t enum for supporting XMC_I2C_CH_E-bleEvent() and XMC_I2C_CH_DisableEvent() for supporting multiple events configuration 3. Fix of 10bit addressing
DSD	❖ Added APIs "XMC_DSD_SetResultEventFlag()" "XMC_DSD_ClearResultEventFlag()" "XMC_DSD_SetAlarmEventFlag()" “XMC_DSD_ClearAlarmEventFlag()”
SCU	❖ Device specific APIs, enums and data structure elements are added (for XMC1400 and XMC47/800 devices) ❖ Device specific pre-processor conditions are added (for XMC1400 and XMC47/800 devices) ❖ Added new APIs (For XMC1 devices): 1. For temperature related: XMC_SCU_SetTempLowLimit(),XMC_SCU_SetTempHighLimit(),XMC_SCU_CalcTemperature(), XMC_SCU_CLOCK_CalibrateOscillatorOnTemperature(). 2. For clock related: XMC_SCU_CLOCK_SetMCLKFrequency(),XMC_SCU_CLOCK_ScaleMCLKFrequency() ❖ Modified APIs: (For XMC1 devices): 1. XMC_SCU_HighTemperature(),XMC_SCU_LowTemperature(),XMC_SCU_CLOCK_lFrequency UpScaling(),XMC_SCU_CLOCK_lFrequencyDownScaling()
SPI	❖ Added new APIs: 1. For e-bling/disabling delay compensation XMC_SPI_CH_DisableDelayCompensation() and XMC_SPI_CH_EnableDelayCompensation() 2. For exter-l input for BRG configuration: XMC_SPI_CH_ConfigExter-lInputSignalToBRG() 3. For configuring the receiving clock phase in the slave: XMC_SPI_CH_DataLatchedInTrailingEdge() and XMC_SPI_CH_DataLatchedInLeadingEdge() ❖ Modified APIs: 1. XMC_SPI_CH_SetInputSource() for avoiding complete DXCR register overwriting.

	2. Modified XMC_SPI_CH_EVENT_t enum for supporting XMC_SPI_CH_EnableEvent() and XMC_SPI_CH_DisableEvent() for supporting multiple events configuration
UART	❖ Modified APIs: 1. XMC_UART_CH_SetInputSource() for avoiding complete DXCR register overwriting. 2. XMC_UART_CH_EVENT_t enum for supporting XMC_UART_CH_EnableEvent() and XMC_UART_CH_DisableEvent() for supporting multiple events configuration
USIC	❖ Added new APIs: 1. For e-bling/disabling delay compensation XMC_USIC_CH_DisableDelayCompensation() and XMC_USIC_CH_DisableDelayCompensation() 2. For defining if the data shift unit input is derived from the input data path DXn or from the selected protocol pre-processors: XMC_USIC_CH_ConnectInputDataShiftToPPP() and XMC_USIC_CH_ConnectInputDataShiftToDataInput() 3. For direct TBUF access: XMC_USIC_CH_WriteToTBUF() and XMC_USIC_CH_WriteToTBUFTCI() 4. For external input for BRG configuration:XMC_USIC_CH_ConfigExternalInputSignalToBRG() and XMC_USIC_CH_SetBRGInputClockSource() 5. For e-bling the transfer trigger unit to set bit TCSR.TE if the trigger sig-l DX2T becomes active. Feature used for RS-232 Clear to Send (CTS) sig-l: XMC_USIC_CH_EnableTBUFDataValidTrigger() and XMC_USIC_CH_DisableTBUFDataValidTrigger(). ❖ Modified APIs: 1. XMC_USIC_CH_SetTransmitBufferStatus API. OR operator removed. 2. Fixed bug in XMC_USIC_CH_BRG_CLOCK_SOURCE_DX1T value.
FLASH	1. XMC1 flash: Erase Page API implementation change for the NVM Errata. NVM routine API called inside XMC_FLASH_ErasePages API. 2. XMC4 flash: Added new APIs XMC_FLASH_Reset XMC_FLASH_ErasePhysicalSector XMC_FLASH_EraseUCB XMC_FLASH_ResumeProtection XMC_FLASH_RepairPhysicalSector
VADC	1. Added new APIs XMC_VADC_GLOBAL_SetIndividualBoundary XMC_VADC_GROUP_SetIndividualBoundary XMC_VADC_GROUP_GetAlias XMC_VADC_GROUP_GetInputClass XMC_VADC_GROUP_ChannelSetIclass XMC_VADC_GROUP_ChannelGetResultAlignment XMC_VADC_GROUP_ChannelGetInputClass XMC_VADC_GROUP_SetResultSubtractionValue XMC_VADC_GROUP_ScanRemoveChannel 2. Added new structure XMC_VADC_DETAILED_RESULT_t
ALL	

7.7 XMC Libs revision history from version v1.0.0

XMC Lib	Revision History
ACMP	3. Additional call to XMC_ACMP_EnableComparator() API needed to start Comparator after Init.

	a. Removed return type variable and by default comparator enable from XMC_ACMP_Init() API. 4. Divided XMC_ACMP_SetInput into two 3 APIs to reduce the code size and complexity as stated below a. XMC_ACMP_E-bleReferenceDivider() b. XMC_ACMP_DisableReferenceDivider() c. XMC_ACMP_SetInput() 5. XMC_ACMP_t typedef changed to structure which overrides the standard header file structure.
BCCU	6. Minor bug fixes in the following APIs: a. XMC_BCCU_ClearEventFlag() b. XMC_BCCU_ConcurrentStartDimming() c. XMC_BCCU_ConcurrentAbortDimming() d. XMC_BCCU_SetGlobalDimmingLevel() 7. Added new APIs: a. XMC_BCCU_DIM_ReadDimDivider() b. XMC_BCCU_DIM_GetDimCurve() c. XMC_BCCU_IsDitherE-ble()
CAN	8. New elements have added in XMC_CAN_MO_t data structure. 9. XMC_CAN_MO_Config() sig-ture has changed. 10. XMC_CAN_STATUS_t enum structure has updated. 11. New APIs are added: a. XMC_CAN_NODE_ClearStatus() b. XMC_CAN_MO_ReceiveData() c. XMC_CAN_GATEWAY_InitDesObject() d. XMC_CAN_NODE_E-ble() 12. Minor fix in XMC_CAN_TXFIFO_ConfigMOSlaveObject().
CCU4	13. In XMC_CCU4_SLICE_StartConfig(), Options in XMC_ASSERT check for start mode is corrected.
CCU8	14. Added XMC_CCU8_SLICE_LoadSelector() API, to select which compare register value has to be loaded during external load event. 15. In XMC_CCU8_SLICE_CHECK_INTERRUPT macro, fixed the missing item for compare match down for channel 2
DMA	16. Added the declarations for the following APIs: a. XMC_DMA_DisableRequestLine b. XMC_DMA_ClearRequestLine, c. XMC_DMA_CH_ClearSourcePeripheralRequest d. XMC_DMA_CH_ClearDesti-tionPeripheralRequest 17. Removed PRIOARRAY
HRPWM	18. XMC_HRPWM_CSG_SelClampingInput() API is added to select the clamping input. 19. Enum XMC_HRPWM_SHADOW_TX_t is re-med to XMC_HRPWM_SHADOW_TX_DAC_t to represent that shadow transfer is for DAC. 20. In XMC_HRPWM_Init() api macros used to check 'ccu_clock' frequency are re-med for readability. 21. 80MHz HRC operation would need a minimum of 70 Mhz CCU clock. 22. CSG trimming data assignment is corrected. 23. Redundant code removed in XMC_HRPWM_HRC_ConfigSourceSelect0() and XMC_HRPWM_HRC_ConfigSourceSelect1() API's. 24. Enums and masks are type casted to uint32_t type.
I2C	25. Modified XMC_I2C_CH_Stop() API for not setting to IDLE the channel if it is busy
POSIF	26. XMC_POSIF_E-ble and XMC_POSIF_Disable APIs updated for POSIF1 peripheral check. 27. XMC_POSIF_QD_GetDirection API is updated to read direction bit correctly.
RTC	28. XMC_RTC_Init() function is modified by adding RTC running condition check
SCU	29. Removed STATIC_INLINE property for the below APIs and declared as void:

	a. XMC_SCU_INTERRUPT_E-bleEvent() b. XMC_SCU_INTERRUPT_DisableEvent() c. XMC_SCU_INTERRUPT_TriggerEvent() d. XMC_SCU_INTERUPT_GetEventStatus() e. XMC_SCU_INTERUPT_ClearEventStatus() 30. XMC_SCU_INTERRUPT_EVENT enum elements are typecasted to int64_t 31. Added new APIs for both XMC4 and XMC1 devices: a. XMC_SCU_INTERRUPT_E-bleEvent() b. XMC_SCU_INTERRUPT_DisableEvent() c. XMC_SCU_INTERRUPT_TriggerEvent() d. XMC_SCU_INTERUPT_GetEventStatus() e. XMC_SCU_INTERRUPT_ClearEventStatus() 32. Added Weak implementation for OSCHP_GetFrequency().
SPI	33. Documentation improved 34. Added new APIs a. XMC_SPI_CH_SetSlaveSelectDelay b. XMC_SPI_CH_TriggerServiceRequest c. XMC_SPI_CH_SelectInterruptNodePointer d. XMC_SPI_CH_SetInterwordDelaySCLK
UART	35. xmc_uart_ch_stop API implementation corrected. 36. Modified XMC_UART_CH_Stop() API for not setting to IDLE if the channel is busy. 37. Added new APIs: a. XMC_UART_CH_TriggerServiceRequest() and XMC_UART_CH_SelectInterruptNodePointer()
USBD	38. Updated the XMC_USBD_EndpointStall() to fix issue on USB clear stall. 39. Updated the XMC_USBD_EndpointConfigure() to fix issue in EP0 configuration. 40. Updated the XMC_USBD_IRQHandler() (Removed the DAVE_CE check on SOF event). 41. Updated the XMC_USBD_Disable() API to gate the clock after programming the SCU registers.
VADC	42. Added new APIs for SHS. a. XMC_VADC_GLOBAL_SHS_SetStepperSequence b. XMC_VADC_GLOBAL_SHS_IsConverterReady c. XMC_VADC_GLOBAL_SHS_E-bleAcceleratedMode d. XMC_VADC_GLOBAL_SHS_DisableAcceleratedMode e. XMC_VADC_GLOBAL_SHS_SetShortSampleTime f. XMC_VADC_GLOBAL_SHS_SetClockDivider g. XMC_VADC_GLOBAL_SHS_SetGainFactor h. XMC_VADC_GLOBAL_SHS_SetMaxCalTime i. XMC_VADC_GLOBAL_SHS_E-bleGai-ndOffsetCalibrations j. XMC_VADC_GLOBAL_SHS_DisableGai-ndOffsetCalibrations k. XMC_VADC_GLOBAL_SHS_GetOffsetCalibrationValue l. XMC_VADC_GLOBAL_SHS_SetOffsetCalibrationValue m. XMC_VADC_GLOBAL_SHS_SetSigmaDeltaLoop n. XMC_VADC_GLOBAL_SHS_E-bleSigmaDeltaLoop o. XMC_VADC_GLOBAL_SHS_DisableSigmaDeltaLoop 43. Added new APIs for trigger edge selection. a. XMC_VADC_GROUP_ScanSelectTriggerEdge b. XMC_VADC_GROUP_QueueSelectTriggerEdge c. XMC_VADC_GROUP_BackgroundSelectTriggerEdge 44. Added new APIs for Queue flush entries, boundary selection, Boundary node pointer. a. XMC_VADC_GROUP_QueueFlushEntries b. XMC_VADC_GROUP_ChannelSetBoundarySelection c. XMC_VADC_GROUP_SetBoundaryEventInterruptNode 45. Updated GatingMode APIs and EMUX Control Init APIs for bug fixes. 46. BFL configuration in channel initialization bug fixed.
ALL	47. GetDriverVersion API is removed from all XMC Libs

7.8 XMC Libs backward compatibility break from version v1.0.0

XMC Lib	Change category	Project upgrade steps
ACMP	1. API functionalities changed. 2. Splitting of API's and signature changes done.	Use DAVE's "APPs upgrade" feature and change API signature as in PR version of XMC Lib Verify the functional correctness
CAN	1. API signature changed 2. Data type and enum item changed	Use DAVE's "APPs upgrade" feature and change enum item and API signature as in PR version of XMC Lib Verify the functional correctness
DMA	Data type item changed	Use DAVE's "APPs upgrade" feature and change the usage of data type as in PR version of XMC Lib Verify the functional correctness
HRPWM	Enum item is renamed	Use DAVE's "APPs upgrade" feature and change enum item as in PR version of XMC Lib Verify the functional correctness
SCU	API signature changed	Use DAVE's "APPs upgrade" feature and change API signature as in PR version of XMC Lib Verify the functional correctness