

MCUXpresso SDK Release Notes for i.MX 8M Devices

1 Overview

The MCUXpresso Software Development Kit (MCUXpresso SDK) is a collection of software enablement for Microcontrollers (MCU) that includes peripheral drivers, other middleware packages, such as multicore support, and integrated RTOS support for FreeRTOS OS. In addition to the base enablement, the MCUXpresso SDK is augmented with demo applications and driver example projects, and API documentation to help the customers quickly leverage the support of the MCUXpresso SDK.

2 MCUXpresso SDK

As part of the MCUXpresso software and tools, MCUXpresso SDK is the evolution of Kinetis SDK v2.0.0 includes support for both LPC and i.MX System-on-Chips (SoC). The same drivers, APIs, and middleware are still available with support for Kinetis, LPC, and i.MX silicon.

NOTE

In order to maintain compatibility with legacy FSL code, the filenames and source code in MCUXpresso SDK containing the legacy

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Freescale prefix 'FSL' have been left as is. The 'FSL' prefix has been redefined as the NXP Foundation Software Library.

3 Development tools

The MCUXpresso SDK was compiled and tested with these development tools:

- IAR Embedded Workbench for ARM version 8.22.1
- Makefiles support with GCC revision v7-2017-q4-major from ARM Embedded

4 Supported development systems

This release supports boards and devices listed in this table. The boards and devices in boldface were tested in this release.

Table 1. Supported MCU devices and development boards

Development boards	MCU devices
MIMX8MQ-EVK	MIMX8MD6CVAHZ, MIMX8MD6DVAJZ, MIMX8MD7CVAHZ, MIMX8MD7DVAJZ, MIMX8MQ5CVAHZ, MIMX8MQ5DVAJZ, MIMX8MQ6CVAHZ, MIMX8MQ6DVAJZ , MIMX8MQ7CVAHZ, MIMX8MQ7DVAJZ,

5 Release contents

This table provides an overview of the MCUXpresso SDK release package contents and locations.

Table 2. Release contents

Deliverable	Location
Boards	<install_dir>/boards
Demo applications	<install_dir>/boards/<board_name>/demo_apps
Driver examples	<install_dir>/boards/<board_name>/driver_examples
RTOS examples	<install_dir>/boards/<board_name>/rtos_examples
Multicore examples	<install_dir>/boards/<board_name>/multicore_examples
Documentation	<install_dir>/docs
Driver, SoC header files, extension header files and feature header files, utilities	<install_dir>/devices/<device_name>
Multicore stack	<install_dir>/middleware/multicore
Cortex Microcontroller Software Interface Standard (CMSIS) ARM Cortex®-M header files, DSP library source	<install_dir>/CMSIS
Peripheral Drivers	<install_dir>/devices/<device_name>/drivers
Utilities such as debug console	<install_dir>/devices/<device_name>/utilities

Table continues on the next page...

Table 2. Release contents (continued)

RTOS Kernel Code	<install_dir>/rtos
Tools	<install_dir>/tools

6 MCUXpresso SDK release package

The MCUXpresso SDK release package contents are aligned with the silicon subfamily it supports. This includes the boards, devices, documentation, and RTOS support.

6.1 Device support

The device folder contains available software enablement for the specific SoC subfamily. This folder includes clock-specific implementation, device register header file, device register feature header file, and the system configuration source files. Included with the standard SoC support are folders containing peripheral drivers, toolchain support, and a simple debug console.

The device-specific header files provide a direct access to the MCU peripheral registers. The device header file provides an overall System-on-Chip (SoC) memory mapped register definition. In addition to the overall device memory mapped header file, the MCUXpresso SDK also includes the feature header file for each peripheral instantiated on the SoC.

The toolchain folder contains the startup code and linker files for each supported toolchain. The startup code is a CMSIS-compliant startup that efficiently transfers the code execution to the main() function.

6.1.1 Board support

The boards folder provides the board-specific demo applications, driver examples, and RTOS examples.

6.1.2 Demo applications and other examples

The demo applications demonstrate the usage of the peripheral drivers to achieve a system level solution. Each demo application contains a readme file that describes the operation of the demo and required setup steps.

The driver examples demonstrate the capabilities of the peripheral drivers. Each example implements a common use case to help demonstrate the driver functionality.

The RTOS folder contains examples demonstrating the use of the included source.

NOTE

Some demo applications and driver examples are intended for a single ARM Cortex-M4 application reference. They cannot support running with the Linux BSP, which requires additional service protocol implementation. See the readme file for the specific application to know whether it supports running with the Linux BSP.

6.2 Middleware

6.2.1 RTOS

The MCUXpresso SDK is integrated with FreeRTOS OS.

6.2.2 CMSIS

The MCUXpresso SDK is shipped with the standard CMSIS development pack, including the prebuilt libraries.

7 MISRA compliance

All MCUXpresso SDK drivers comply to MISRA 2004 rules with the following exceptions.

Exception Rules	Description
1.1	All code shall conform to ISO 9899:1990 Programming languages - C, amended and corrected by ISO/IEC 9899/COR1:1995, ISO/IEC 9899/AMD1:1995, and ISO/IEC
2.4	Sections of code should not be commented out.
5.1	Identifiers (internal and external) shall not rely on the significance of more than 31 characters.
6.3	typedefs that indicate size and signedness should be used in place of the basic types.
6.4	Bitfields shall only be defined to be of type unsigned int or signed int.
8.1	Functions shall have prototype declarations and the prototype shall be visible at both the function definition and call.
8.5	There shall be no definitions of objects or functions in a header file.
8.1	All declarations and definitions of objects or functions at file scope shall have internal linkage unless external linkage is required.
8.12	When an array is declared with external linkage, its size shall be stated explicitly or defined implicitly by initialization.
	The value of an expression of integer type shall not be implicitly converted to a different underlying type if:
	a. it is not a conversion to a wider integer type of the same signedness, or
	b. the expression is complex, or
	c. the expression is not constant and is a function argument, or
10.1	d. the expression is not constant and is a return expression.
10.3	The value of a complex expression of integer type shall only be cast to a type that is not wider and of the same signedness as the underlying type of the expression.
11.3	A cast should not be performed between a pointer type and an integral type.
11.4	A cast should not be performed between a pointer to object type and a different pointer to object type.
11.5	A cast shall not be performed that removes any const or volatile qualification from the type addressed by a pointer.
12.2	The value of an expression shall be the same under any order of evaluation that the standard permits.
12.4	The right-hand operand of a logical && or operator shall not contain side effects.
12.6	The operands of logical operators (&&, , and !) should be effectively boolean. Expressions that are effectively boolean should not be used as operands to operators other than (&&, , !, =, !=, and ?:).
12.13	The increment (++) and decrement (--) operators should not be mixed with other operators in an expression.
14.3	Before preprocessing, a null statement shall only occur on a line by itself; it may be followed by a comment, provided that the first character following the null statement is a whitespace character.
14.5	The continue statement shall not be used.
14.7	A function shall have a single point of exit at the end of the function.
16.1	Functions shall not be defined with a variable number of arguments.
17.4	Array indexing shall be the only allowed form of pointer arithmetic.
18.4	Unions shall not be used.
19.1	#include statements in a file should only be preceded by other preprocessor directives or comments.
19.1	In the definition of a function-like macro, each instance of a parameter shall be enclosed in parentheses unless it is used as the operand of # or ##.
20.4	Dynamic heap memory allocation shall not be used.
20.9	The input/output library <stdio.h> shall not be used in production code.

Figure 1. MISRA exceptions

8 Known Issues

8.1 Maximum file path length in Windows® 7 Operating System

Windows 7 operating system imposes a 260 character maximum length for file paths. When installing the MCUXpresso SDK, place it in a directory close to the root to prevent file paths from exceeding the maximum character length specified by the Windows operating system. The recommended location is the C:\nxp folder.

MCUXpresso SDK Release Notes for i.MX 8M Devices

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1 Driver Change Log

ECSPI

The current eCSPI driver version is 2.0.0.

- 2.0.0
 - Initial version.

GPT

The current GPT driver version is 2.0.0.

- 2.0.0
 - Initial version.

GPIO

The current GPIO driver version is 2.0.1.

- 2.0.1:
 - API Interface change:
 - * Refined naming of API while keeping all original APIs marking them as deprecated. Original API will be removed in next release. The main change is update API with prefix of `_PinXXX()` and `_PortXXX()`.
- 2.0.0
 - Initial version.

I2C

The current I2C driver version is 2.0.3.

- 2.0.3
 - Improvement:
 - * Improve code readability, add new static API `I2C_WaitForStatusReady` for the status flag wait, and change to call `I2C_WaitForStatusReady` instead of polling flags with reading register.
- 2.0.2
 - Improvement:
 - * Added `I2C_WATI_TIMEOUT` macro to allow user to specify the timeout times for waiting flags in functional API and blocking transfer API.
- 2.0.1
 - Bug fixes:

- * Added proper handle for transfer config flag `kI2C_TransferNoStartFlag` to support transmit with `kI2C_TransferNoStartFlag` flag. Only supports write only or write+read with no start flag, does not support read only with no start flag.
- 2.0.0
 - Initial version.

PWM

The current PWM driver version is 2.0.0.

- 2.0.0
 - Initial version.

UART

The current UART driver version is 2.0.0.

- 2.0.0
 - Initial version.

MU

The current MU driver version is 2.0.2.

- 2.0.2
 - Added support for MIMX8MQx.
- 2.0.1
 - Added support for MCIMX7Ux_M4.
- 2.0.0
 - Initial version.

QSPI

The current QSPI driver version is 2.0.2.

- 2.0.2
 - New macro functions:
 - * Added `QSPI_LUT_SEQ()` function for users to set LUT table easily.
 - * Added LUT command macros for users to easy use.
 - Comment update:
 - * Added the comments for the limitation of `QSPI_ReadBlocking` and `QSPI_Transfer-ReceiveBlocking`.
- 2.0.1

- New API:
 - * QSPI_SetReadArea to set the read area.
- Bug fixes:
 - * Fixed QSPI_UpdateLUT function only update first LUT issue.
 - * Fixed issue that some function that hardcode QSPI0 as base.
- 2.0.0
 - Initial version.

RDC

The current RDC driver version is 2.0.0.

- 2.0.0
 - Initial version.

RDC_SEMA42

The current RDC_SEMA42 driver version is 2.0.0.

- 2.0.0
 - Initial version.

SAI

The current SAI driver version is 2.1.4.

- 2.1.4
 - New features:
 - * Added API to enable/disable auto FIFO error recovery in platforms which supports this feature.
 - * Added API to set data packing feature in platforms which supports this feature.
- 2.1.3
 - New feature:
 - * Added feature to make I2S frame sync length configurable according to bitWidth.
- 2.1.2
 - Bug fixes:
 - * Added 24-bit support for SAI eDMA transfer. All data should be 32 bits for send/receive, as eDMA cannot directly handle 3 byte transfer.
- 2.1.1
 - Optimization:
 - * Reduced code size while not using transactional API.
- 2.1.0
 - API name changes:
 - * SAI_GetSendRemainingBytes -> SAI_GetSentCount

- * SAI_GetReceiveRemainingBytes -> SAI_GetReceivedCount
- * All transactional API name add "Transfer" prefix.
- * All transactional API use base and handle as input parameter.
- * Unified the parameter names.
- Bug fixes:
 - * Fixed w1c bug while reading TCSR/RCSR registers.
 - * Fixed MOE enable flow issue, moved MOE enable after MICS settings in SAI_TxInit/SAI_RxInit.
- 2.0.0
 - Initial version.

SEMA4

The current SEMA4 driver version is 2.0.0.

- 2.0.0
 - Initial version.

TMU

The current TMU driver version is 2.0.0.

- 2.0.0
 - Initial version.
 - This module is developed firstly on i.MX 8MQuad.

WDOG

The current WDOG driver version is 2.0.0.

- 2.0.0
 - Initial version.

2 RTOS Change Log

FreeRTOS for MCUXpresso SDK

The current version is FreeRTOS 9.0.0. The original package is available at freertos.org.

- 9.0.0_rev3
 - New features:
 - * Tickless idle mode support for Cortex-A7. Added `fsl_tickless_epit.c` and `fsl_tickless_generic.h` in `portable/IAR/ARM_CA9` folder.
 - * Enabled float context saving in IAR for Cortex-A7. Added `configUSE_TASK_FPU_SUPPORT` macros. Modify `port.c` and `portmacro.h` in `portable/IAR/ARM_CA9` folder.
 - Other changes:
 - * Transformed `ARM_CM` core specific tickless low-power support into generic form under `freertos/Source/portable/low_power_tickless`.
- 9.0.0_rev2
 - New features:
 - * Enabled MCUXpresso thread-aware debugging. Added `freertos_tasks_c_additions.h` and `configINCLUDE_FREERTOS_TASK_C_ADDITIONS_H` and `configFRTOS_MEMORY_SCHEME` macros.
- 9.0.0_rev1
 - New features:
 - * Enabled `-flto` optimization in GCC by adding `attribute((used))` for `vTaskSwitchContext`.
 - * Enabled KDS Task Aware Debugger. Applied FreeRTOS patch to enable `configRECORD_STACK_HIGH_ADDRESS` macro. Modified files are `task.c` and `FreeRTOS.h`.
- 9.0.0_rev0
 - New features:
 - * Example `freertos_sem_static`.
 - * Static allocation support RTOS driver wrappers.
 - Other changes:
 - * Tickless idle rework. Support for different timers is in separated files (`fsl_tickless_systick.c`, `fsl_tickless_lptmr.c`).
 - * Removed configuration option `configSYSTICK_USE_LOW_POWER_TIMER`. Low power timer is now selected by linking of appropriate file `fsl_tickless_lptmr.c`.
 - * Removed `configOVERRIDE_DEFAULT_TICK_CONFIGURATION` in RVDS port. Use of `attribute((weak))` is preferred solution. Not same as `_weak`!
- 8.2.3
 - New features:
 - * Tickless idle mode support.
 - * Added template application for Kinetis Expert (KEx) tool (`template_application`).
 - Other changes:
 - * Folder structure reduction. Keep only Kinetis related parts.

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