

# MCUXSDKMIMXRT6XXRN

## MCUXpresso SDK Release Notes for EVK-MIMXRT685

Rev. 0 — 29 December 2020

Release Notes

### 1 Overview

The MCUXpresso Software Development Kit (SDK) is a collection of software enablement for microcontrollers that includes peripheral drivers, high-level stacks including other middleware packages. In addition to the base enablement, the MCUXpresso SDK is augmented with demo applications, driver example projects, and API documentation to help the customers quickly leverage the support of the MCUXpresso SDK. For details on MCUXpresso SDK, see [MCUXpresso-SDK: Software Development Kit for MCUXpresso](#).

### 2 MCUXpresso SDK

As part of the MCUXpresso software and tools, MCUXpresso SDK is the evolution of Kinetis SDK v2.7.0, includes support for LPC, DSC, and i.MX System-on-Chip (SoC). The same drivers, APIs, and middleware are still available with support for Kinetis, LPC, DSC, and i.MX silicon. The MCUXpresso SDK adds support for the MCUXpresso IDE, an Eclipse-based toolchain that works with all MCUXpresso SDKs. Easily import your SDK into the new toolchain to access to all of the available components, examples, and demos for your target silicon. In addition to the MCUXpresso IDE, support for the MCUXpresso Config Tools allows easy cloning of existing SDK examples and demos, allowing users to leverage the existing software examples provided by the SDK for their own projects.

In order to maintain compatibility with legacy Freescale code, the filenames and source code in MCUXpresso SDK containing the legacy Freescale prefix FSL has been left as is. The FSL prefix has been redefined as the NXP Foundation Software Library.

### 3 Development tools

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

- Keil MDK, version is 5.33
- MCUXpresso IDE, version is 11.3.0
- GCC ARM Embedded, version is 9-2020-q2-update
- IAR Embedded Workbench for ARM, version is 8.50.9
- Xtensa C Compiler, version is 14.01
- Xtensa Xplorer, version is 8.0.10

### 4 Supported development system

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

Table 1. Supported boards and devices

| Development boards | MCU devices  |
|--------------------|--|
| EVK-MIMXRT685      | <b>MIMXRT685SFVKB</b> , MIMXRT633SFAWBR, MIMXRT685SFFOB, MIMXRT633SFFOB, MIMXRT685SFAWBR, MIMXRT685SFVKB, MIMXRT633SFVKB |

#### Contents

|   |                                      |   |
|---|--------------------------------------|---|
| 1 | Overview.....                        | 1 |
| 2 | MCUXpresso SDK.....                  | 1 |
| 3 | Development tools.....               | 1 |
| 4 | Supported development system.....    | 1 |
| 5 | MCUXpresso SDK release package ..... | 2 |
| 6 | Release contents.....                | 5 |
| 7 | MISRA compliance.....                | 5 |
| 8 | Known Issues.....                    | 7 |
| 9 | Change Log.....                      | 9 |



## 5 MCUXpresso SDK release package

The MCUXpresso DSC SDK release package content is aligned with the silicon subfamily it supports. This includes the boards, devices, documentation, and middleware.

### 5.1 Device support

The device folder contains the whole software enablement available for the specific System-on-Chip (SoC) subfamily. This folder includes clock-specific implementation, device register header files, device register feature header files, and the system configuration source files. Included with the standard SoC support are folders containing peripheral drivers, toolchain support, and a standard debug console. The device-specific header files provide a direct access to the microcontroller peripheral registers. The device header file provides an overall SoC memory mapped register definition. The folder also includes the feature header file for each peripheral on the microcontroller. The toolchain folder contains the startup code and linker files for each supported toolchain. The startup code efficiently transfers the code execution to the `main()` function.

#### 5.1.1 Board support

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

#### 5.1.2 Demo application 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.

### 5.2 CMSIS DSP Lib

#### 5.2.1 CMSIS DSP Library

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

### 5.3 Operating System

#### 5.3.1 FreeRTOS

The MCUXpresso SDK is integrated with FreeRTOS OS.

### 5.4 Middleware

#### 5.4.1 AWS IoT

AWS IoT

#### 5.4.2 DSP Audio Streamer

DSP Audio Streamer Framework based on Xtensa Audio Framework from Cadence Design Systems for Xtensa DSP Audio Engines.

#### 5.4.3 eap

Essential Audio Processing library

#### 5.4.4 eIQ

eIQ machine learning SDK containing:

- Arm CMSIS-NN library (neural network kernels optimized for Cortex-M cores)
- inference engine for running TensorFlow Lite models
- project examples for the Glow NN Compiler

### 5.4.5 emWin

The MCUXpresso SDK is pre-integrated with the SEGGER emWin GUIBuilder.

### 5.4.6 Fatfs

The FatFs file system is integrated with the MCUXpresso SDK and can be used to access either the SD card or the USB memory stick when the SD card driver or the USB Mass Storage Device class implementation is used.

### 5.4.7 ISSDK

IoT Sensing SDK (ISSDK) provides sensor drivers and reference examples for NXP's IoT sensors.

### 5.4.8 littlevgl

littlevgl graphics library

### 5.4.9 lwIP

The lwIP TCP/IP stack is pre-integrated with MCUXpresso SDK and runs on top of the MCUXpresso SDK Ethernet driver with Ethernet-capable devices/boards.

For details, see the *lwIP TCP/IP Stack and MCUXpresso SDK Integration User's Guide* (document MCUXSDKLWIPUG).

### 5.4.10 Mbed Crypto

Mbed Crypto library

### 5.4.11 mbedtls

mbedtls SSL/TLS library

### 5.4.12 multicore

Multicore Software Development Kit

### 5.4.13 mcu-boot

mcu-boot

### 5.4.14 NatureDSP

Digital Signal Processing for Xtensa DSP Audio Engines.

### 5.4.15 nhttp2

nhttp2 library

### 5.4.16 NXP WiFi

The MCUXpresso SDK provides driver for NXP WiFi external modules. The WiFi driver is integrated with LWIP TCP/IP stack and demonstrated with several network applications (iperf and AWS IoT).

The following are the supported external processor and modules:

- NXP 88W8977 based PAN9026 Panasonic SDIO module (ENWF9201AZE)
- NXP 88W8801 based AW-NM191SM AzureWave module (AW-NM191NF-uSD)

### 5.4.17 PSA Test Suite

Arm Platform Security Architecture Test Suite

### 5.4.18 sdmmc stack

The SDMMC software is integrated with MCUXpresso SDK to support SD/MMC/SDIO standard specification. This also includes a host adapter layer for bare-metal/RTOS applications.

### 5.4.19 TF-M

Trusted Firmware - M Library

### 5.4.20 USB Authentication

USB Type-C PD authentication

### 5.4.21 USB stack

See the MCUXpresso SDK USB Stack User's Guide (document MCUXSDKUSBSUG) for more information.

#### 5.4.21.1 Peripheral devices tested with USB Host stack

[Table 2](#) provides a list of USB devices tested with the USB Host stack.

Table 2. Peripheral devices

| Device type             | Device   |
|-------------------------|--|
| USB HUB                 | BELKIN F5U233BELKIN F5U304BELKIN F5U307BELKIN F4U040UNITEK Y-2151Z-TEK ZK032AHYUNDAI HY-HB608  |
| USB flash drive         | ADATA C008 32 GBADATA S102 8 GADATA S102 16 GVerbatim STORE N GO USB Device 8 GKingston DataTraveler DT101 G2SanDisk Cruzer Blade 8 GBUnisplendour 1 Glmation 2 GBV-mux 2 GBSanmina-SCI 128 MCorporate Express 1 GTOSHIBA THUHYBS-008G 8 GTranscend JF700 8 GNetac U903 16 GSSK SFD205 8 GBReX 4 GBSAMSUNG USB3.0 16GB |
| USB card reader/adaptor | SSK TF adapterKawau Multi Card ReaderKawau TF adapterKawau SDHC cardUSB Mouse DELL MS111-PDELL M066U0ADELL MUAVDEL8TARGUS AMU76APDELL MD56U0DELL MS111-TRAPOO M110   |
| USB Keyboard            | DELL SK8135DELL SK8115   |

### 5.4.22 USB Type-C PD Stack

See the *MCUXpresso SDK USB Type-C PD Stack User's Guide* (document MCUXSDKUSBPDU) for more information.

#### NOTE

The USB TYPE-C PD stack supports IAR only.

### 5.4.23 vit

Voice intelligent technology library

### 5.4.24 wifi\_wiced

The MCUXpresso SDK provides integration with Cypress Wiced SDK supporting the Murata Type 1DX and Azurewave AWNM372SM modules based on the CYW4343W and CYW43438 processors.

## 6 Release contents

[Table 3](#) provides an overview of the MCUXpresso SDK release package contents and locations.

**Table 3. MCUXpresso SDK release package contents and locations**

| Deliverable  | Location   |
|--|--|
| Boards   | INSTALL_DIR/boards                                 |
| Demo Applications  | INSTALL_DIR/boards/<board_name>/demo_apps          |
| Driver Examples  | INSTALL_DIR/boards/<board_name>/driver_examples    |
| Board Project Template for MCUXpresso IDE NPW  | INSTALL_DIR/boards/<board_name>/utilities          |
| Driver, SoC header files, extension header files and feature header files, utilities | INSTALL_DIR/devices/<device_name>                  |
| CMSIS drivers  | INSTALL_DIR/devices/<device_name>/cmsis_drivers    |
| Peripheral drivers   | INSTALL_DIR/devices/<device_name>/drivers          |
| Toolchain linker files and startup code  | INSTALL_DIR/devices/<device_name>/<toolchain_name> |
| Utilities such as debug console  | INSTALL_DIR/devices/<device_name>/utilities        |
| Device Project Template for MCUXpresso IDE NPW                                       | INSTALL_DIR/devices/<device_name>/utilities        |
| CMSIS Arm Cortex-M header files, DSP library source                                  | INSTALL_DIR/CMSIS                                  |
| Components and board device drivers  | INSTALL_DIR/components                             |
| Documents  | INSTALL_DIR/docs                                   |
| RTOS   | INSTALL_DIR/rtos                                   |
| Release Notes, Getting Started Document and other documents                          | INSTALL_DIR/docs                                   |
| Tools such as shared cmake files   | INSTALL_DIR/tools                                  |

## 7 MISRA compliance

All MCUXpresso SDK drivers comply to MISRA 2012 rules with exceptions in [Table 4](#).

**Table 4. MISRA exception rules**

| Exception rules | Description   |
|-----------------|---|
| Directive 4.4   | Sections of code should not be commented out.   |
| Directive 4.5   | Identifiers in the same name space with overlapping visibility should be typographically unambiguous.   |
| Directive 4.6   | Typedefs that indicate size and signedness should be used in place of the basic numerical types.  |
| Directive 4.8   | If a pointer to a structure or union is never dereferenced within a translation unit, then the implementation of the object should be hidden. |
| Directive 4.9   | A function should be used in preference to a function-like macro where they are interchangeable.  |
| Directive 4.13  | Functions which are designed to provide operations on a resource should be called in an appropriate sequence.                                 |
| Rule 1.2        | Language extensions should not be used.   |
| Rule 2.3        | A project should not contain unused type declarations.  |
| Rule 2.4        | A project should not contain unused tag declarations.   |
| Rule 2.5        | A project should not contain unused macro declarations.   |
| Rule 2.6        | A function should not contain unused label declarations.  |
| Rule 2.7        | There should be no unused parameters in functions.  |
| Rule 4.2        | Trigraphs should not be used.   |
| Rule 5.1        | External identifiers shall be distinct.   |
| Rule 5.4        | Macro identifiers shall be distinct.  |
| Rule 5.9        | Identifiers that define objects or functions with internal linkage should be unique.  |
| Rule 8.7        | Functions and objects should not be defined with external linkage if they are referenced in only one translation unit.                        |
| Rule 8.9        | An object should be defined at block scope if its identifier only appears in a single function.   |
| Rule 8.11       | When an array with external linkage is declared, its size should be explicitly specified.   |
| Rule 8.13       | A pointer should point to a const-qualified type whenever possible.   |

*Table continues on the next page...*

Table 4. MISRA exception rules (continued)

| Exception rules | Description  |
|-----------------|--|
| Rule 10.5       | The value of an expression should not be cast to an inappropriate essential type.  |
| Rule 11.4       | A conversion should not be performed between a pointer to object and an integer type.  |
| Rule 11.5       | A conversion should not be performed from pointer to void into pointer to object.  |
| Rule 12.1       | The precedence of operators within expressions should be made explicit.  |
| Rule 12.3       | The comma operator should not be used.   |
| Rule 12.4       | Evaluation of constant expressions should not lead to unsigned integer wrap-around.  |
| Rule 13.3       | A full expression containing an increment (++) or decrement (--) operator should have no other potential side effects other than that caused by the increment or decrement operator. |
| Rule 15.4       | There should be no more than one break or go to statement used to terminate any iteration statement.   |
| Rule 17.5       | The function argument corresponding to a parameter declared to have an array type shall have an appropriate number of elements.  |
| Rule 17.8       | A function parameter should not be modified.   |
| Rule 19.2       | The union keyword should not be used.  |
| Rule 20.1       | #include directives should only be preceded by preprocessor directives or comments.  |
| Rule 20.10      | The # and ## preprocessor operators should not be used.  |
| Rule 21.1       | #define and #undef shall not be used on a reserved identifier or reserved macro name.  |
| Rule 21.2       | A reserved identifier or macro name shall not be declared.   |
| Rule 21.12      | The exception handling features of <fenv.h> should not be used.  |

## 8 Known Issues

## 8.1 Maximum file path length in Windows 7 operating system

The 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:\<folder>.

## 8.2 New Project Wizard compile failure

The following components request the user to manually select other components that they depend upon in order to compile.

These components depend on several other components and the New Project Wizard (NPW) is not able to decide which one is needed by the user.

### NOTE

xxx means core variants, such as, cm0plus, cm33, cm4, cm33\_nodsp.

**Components:**issdk\_mag3110, issdk\_host, systick, gpio\_kinetis, gpio\_lpc, issdk\_mpl3115, sensor\_fusion\_agm01, sensor\_fusion\_agm01\_lpc, issdk\_mma845x, issdk\_mma8491q, issdk\_mma865x, issdk\_mma9553, and CMSIS\_RTOS2.

Also for low-level adapter components, currently the different types of the same adapter cannot be selected at the same time.

For example, if there are two types of timer adapters, gpt\_adapter and pit\_adapter, only one can be selected as timer adapter in one project at a time. Duplicate implementation of the function results in an error.

### NOTE

Most of middleware components have complex dependencies and are not fully supported in new project wizard. Adding a middleware component may result in compile failure.

## 8.3 Low speed devices not supported

The host examples cannot support low-speed devices

## 8.4 IAR cannot debug RAM application with J-Link

Currently, IAR will call J-Link reset after the application is downloaded to SRAM, but such operation will cause SRAM data lost.

Here's a workaround to avoid real reset, with the cost of no any reset during the debugging, and hardware status uncleared.

1. Build and debug IAR project once and see the settings folder created.
2. Create the \_JLinkScript file in the settings folder with the following contents.

```
void ResetTarget(void) {  
    JLINK_TARGET_Halt();  
}
```

1. Debug the project again and now it can work.

Figure 1. hello\_world JLink script example

## 8.5 CMSIS PACK new project compile failure

The generated configuration cannot be applied globally. The components, serial\_manager\_usb\_cdc\_virtual and serial\_manager\_usb\_cdc\_virtual\_xxx (xxx means core variants like cm0plus, cm33, cm4, and cm33\_nodsp) are unsupported for new project wizard of CMSIS pack and will lead to compile failure if selected while creating new project(s).

## 8.6 Dsp\_xaf\_demo cannot handle certain audio file types

Audio files encoded using ffmpeg tool and Lavf/Lavc codec cannot be played. M4A format of AAC files is not supported either.



If the demo stops responding while trying to play any of unsupported files, please reset the board.

### **8.7 EAP in dsp\_xaf\_demo for RT685 limitation**

The Essential Audio Processing in dsp\_xaf\_demo supports only stereo files with 44.1 and 48 kHz sample rate.

### **8.8 Cannot add SDK components into FreeRTOS projects**

It is not possible to add any SDK components into FreeRTOS project using the MCUXpresso IDE New Project wizard.

### **8.9 Board may reset itself when running SD card related cases**

Board may reset itself when running SD card related cases. However, the issue is not reproduced if more power supply is connected.

## **9 Change Log**

Change log of software components included in the package, see MCUXpresso SDK ChangeLog\_MIMXRT685S.pdf.

## How To Reach Us

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