

# **MCUXpresso SDK Release Notes**

## **Supporting EVK-MIMXRT1020**



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# Chapter 1

## Overview

The MCUXpresso Software Development Kit (SDK) is a collection of software enablement for Microcontrollers that includes peripheral drivers, high-level stacks including FatFs, USB, lwIP, mbed TLS cryptography libraries, other middleware packages, 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.

For more details about MCUXpresso SDK, see the MCUXpresso SDK homepage [MCUXpresso-SDK: Software Development Kit](#).

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### NOTE

See the attached Change Logs section at the end of this document to reference the device-specific driver logs, middleware logs, and RTOS log.

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# Chapter 2

## MCUXpresso SDK

As part of the MCUXpresso software and tools, MCUXpressoSDK, 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. 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 have 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 for easy cloning of existing SDK examples and demos, allowing users to easily leverage the existing software examples provided by the SDK for their own projects.

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### NOTE

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.

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# Chapter 3

## Development tools

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

- IAR Embedded Workbench for Arm version 8.32.3
- MDK-Arm Microcontroller Development Kit (Keil)<sup>®</sup> 5.27
- Makefiles support with GNU Tools for Arm Embedded Processors 8-2018q4-major
- MCUXpresso IDE v11.0.0

## Chapter 4

# Supported development systems

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

**Table 1. Supported MCU devices and development boards**

Development boards	MCU devices
<b>EVK-MIMXRT1020</b>	MIMXRT1021CAF4A, MIMXRT1021CAG4A, MIMXRT1021DAF5A, <b>MIMXRT1021DAG5A</b>

# Chapter 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
USB demo applications	<install_dir>/boards/<board_name>/usb_examples
lwIP demo applications	<install_dir>/boards/<board_name>/lwip_examples
Driver examples	<install_dir>/boards/<board_name>/driver_examples
Cortex Microcontroller Software Interface Standard (CMSIS) driver examples	<install_dir>/boards/<board_name>/cmsis_driver_examples
FatFS examples	<install_dir>/boards/<board_name>/fatfs_examples
AWS IoT SDK examples	<install_dir>/boards/<board_name>/aws_examples
RTOS examples	<install_dir>/boards/<board_name>/rtos_examples
Cypress WiFi stack examples	<install_dir>/boards/<board_name>/wifi_cypress_examples
mbed TLS examples	<install_dir>/boards/<board_name>/mbedtls_examples
Documentation	<install_dir>/docs
USB Documentation	<install_dir>/docs/usb
lwIP Documentation	<install_dir>/docs/lwip
Middleware	<install_dir>/middleware
mbed TLS	<install_dir>/middleware/mbedtls
lwIP stack	<install_dir>/middleware/lwip
Cypress Wiced SDK (WiFi, BLE)	<install_dir>/middleware/wiced
jsmn	<install_dir>/middleware/aws_iot/external_libs/jsmn
AWS IoT	<install_dir>/middleware/aws_iot
FatFS stack	<install_dir>/middleware/fatfs
USB stack	<install_dir>/middleware/usb
Driver, SoC header files, extension header files and feature header files, utilities	<install_dir>/devices/<device_name>
CMSIS Arm Cortex <sup>®</sup> -M header files, DSP library source	<install_dir>/CMSIS
Peripheral Drivers	<install_dir>/devices/<device_name>/drivers
CMSIS drivers	<install_dir>/devices/<device_name>/cmsis_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
segger_systemview	<install_dir>/boards/<board>/rtos_examples/visualization/ freertos_segger_sysview
percepio_snapshot	<install_dir>/boards/<board>/rtos_examples/visualization/ freertos_percepio_snapshot
gradle	<install_dir>/boards/<board>/aws_examples/ remote_control_android/gradle, boards/<board>/ aws_examples/led_wifi_android/gradle, boards/<board>/ aws_examples/device_configuration_android/gradle
FNET	<install_dir>/boards/<board>/aws_examples/ device_configuration_enet/fnet_mdns
AWS Remote Control	<install_dir>/boards/<board>/aws_examples/ remote_control_android/AwsRemoteControl.apk
AWS LED WiFi	<install_dir>/boards/<board>/aws_examples/ led_wifi_android/AwsLedWifi.apk
AWS Device Configuration	<install_dir>/boards/<board>/aws_examples/ device_configuration_android/AwsDeviceConfiguration.apk



# Chapter 6

## MCUXpresso SDK release package

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

### 6.1 Device support

The device folder contains all available software enablement for the specific System-on-Chip (SoC) subfamily. This folder includes clock-specific implementation, device register header file, device register feature header file, CMSIS derived device SVD, 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 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 CMSIScompliant 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, RTOS, and middleware 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.

### 6.2 Middleware

#### 6.2.1 USB stack

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

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

This table provides a list of USB devices tested with the USB Host stack.

**Table 3. Peripheral devices**

Device type	Device
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*Table continues on the next page...*

**Table 3. Peripheral devices (continued)**

USB HUB	BELKIN F5U233 BELKIN F5U304 BELKIN F5U307 BELKIN F4U040 UNITEK Y-2151 Z-TEK ZK032A HYUNDAI HY-HB608
USB flash drive	ADATA C008 32 GB ADATA S102 8 G ADATA S102 16 G Verbatim STORE N GO USB Device 8 G Kingston DataTraveler DT101 G2 SanDisk Cruzer Blade 8 GB Unisplendour 1 G Imation 2 GB V-mux 2 GB Sanmina-SCI 128 M Corporate Express 1 G TOSHIBA THUHYBS-008G 8 G Transcend JF700 8 G Netac U903 16 G SSK SFD205 8 GB Rex 4 GB SAMSUNG USB3.0 16GB
USB card reader/adapter	SSK TF adapter Kawau Multi Card Reader Kawau TF adapter Kawau SDHC card

*Table continues on the next page...*

**Table 3. Peripheral devices (continued)**

USB Mouse	DELL MS111-P DELL M066U0A DELL MUAVDEL8 TARGUS AMU76AP DELL MD56U0 DELL MS111-T RAPOO M110
USB Keyboard	DELL SK8135 DELL SK8115

## 6.2.2 TCP/IP stack

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).

## 6.2.3 Cypress Wiced SDK (WiFi, BLE)

The MCUXpresso SDK provides integration with Cypress Wiced SDK supporting the Murata Type 1DX and 1LV modules based on the CYW4343W and CYW46012 processors.

The solution is based on Embedded Artists Type 1DX M.2 EVB, which provides IEEE 802.11/b/g/n connectivity. IDX M.2 EVB is connected to the RT10xx EVK Micro SD card slot using Murata uSD-M.2 Adapter.

## 6.2.4 File system

The FatFs file system is integrated with 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.

## 6.2.5 RTOS

The MCUXpresso SDK is integrated with FreeRTOS OS.

## 6.2.6 CMSIS

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

## Chapter 7

# MISRA compliance

All MCUXpresso SDK drivers and USB stack comply to MISRA 2012 rules with the following exceptions.

**Table 4. MISRA exceptions**

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	Typedef that indicate size and signedness should be used in place of the basic numerical type.
Directive 4.8	If a pointer to a structure or union is never dereferenced within a transaction 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 4.10	Precautions shall be taken in order to prevent the contents of a header file being included more than once.
Directive 4.11	The validity of values passed to library functions shall be checked.
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 2.7	There should be no unused parameters in functions.
Rule 3.1	The character sequences <code>/*</code> and <code>//</code> shall not be used within a comment.
Rule 5.1	External identifiers shall be distinct.
Rule 5.3	An identifier declared in an inner scope shall not hide an identifier declared in an outer scope.
Rule 5.7	A tag name shall be a unique identifier.
Rule 5.9	Identifiers that define objects or functions with external linkage shall be unique.
Rule 8.13	A pointer should point to a const-qualified type whenever possible.
Rule 8.3	All declarations of an object or function shall use the same names and type qualifiers.
Rule 8.6	An identifier with external linkage shall have exactly one external definition.
Rule 8.7	Octal constants shall not be used.

*Table continues on the next page...*

**Table 4. MISRA exceptions (continued)**

Rule 8.9	A object should be defined at block scope if its identified only appears in a single function.
Rule 10.1	Operands shall not be of an inappropriate essential type.
Rule 10.3	The value of an expression shall not be assigned to an object with a narrower essential type of a different essential type category.
Rule 10.4	Both operands of an operator in which the usual arithmetic conversions are performed shall have the same essential type category.
Rule 10.5	The value of an expression should not be cast to an inappropriate essential type.
Rule 10.6	The value of a composite expression shall not be assigned to an object with wider essential type.
Rule 10.7	If a composite expression is used as one operand of an operator in which the usual arithmetic conversions are performed then the other operand shall not have wider essential type.
Rule 10.8	The value of a composite expression shall not be cast to a different essential type category or a wider essential type.
Rule 11.1	Conversions shall not be performed between a pointer to a function and any other type.
Rule 11.3	A case shall not be performed between a pointer to object type and a pointer to a different object 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 11.6	A cast shall not be performed between pointer to void and an arithmetic type.
Rule 12.1	The precedence of operators within expressions should be made explicit.
Rule 12.2	The right hand operator of a shift operator shall lie in the range zero to one less than the width in bits of the essential type of the left hand operand.
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 13.5	The right hand operand of a logical && or    operator shall not contain persistent side effects.
Rule 14.2	A for loop shall be well formed.

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**Table 4. MISRA exceptions (continued)**

Rule 14.4	The controlling expressions of an statement and the controlling expression of an iteration-statement shall have essentially Boolean type.
Rule 15.5	A function should have a single point of exit at the end.
Rule 16.1	All switch statements shall be well-formed.
Rule 17.1	The feature of <stdarg.h> shall not be used.
Rule 18.4	The +, -, += and -= operators should not be applied to an expression of pointer type.
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.

## Chapter 8

### Known issues

#### 8.1 Maximum file path length in Windows 7<sup>®</sup> 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.

#### 8.2 USBFS controller issue

Because of the USBFS controller design issues, the USB host suspend/resume demos (`usb_suspend_resume_host_hid_mouse`) of the full speed controller do not support the low speed device directly.

#### 8.3 Create new project without board template

The following components should be selected at the same time when creating a new project without using a board template, including `serial_manager`, `serial_manager_uart`, `debug_console`, and one UART adapter (`lpuart_adapter` for LPUART IP, `uart_adapter` for UART IP, `lpSCI_adapter` for LPSCI IP, etc).

#### 8.4 AWS examples

`aws_greenrass_discovery_enet`, `aws_remote_control_enet` and `aws_remote_control_wifi` are not working (failed to connect to AWS server) in MCUXpresso IDE in release target.

## How To Reach Us

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[nxp.com](http://nxp.com)

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