

# Freescal<sup>™</sup> MQX<sup>™</sup> 3.8.0 for TWR-K21D50M

## Release Notes

|                         |  |
|-------------------------|--|
| <b>PRODUCT:</b>         | Freescal <sup>™</sup> MQX <sup>™</sup> RTOS 3.8.0 for TWR-K21D50M                    |
| <b>PRODUCT VERSION:</b> | 1.0  |
| <b>DESCRIPTION:</b>     | Freescal <sup>™</sup> MQX <sup>™</sup> RTOS 3.8.0 standalone package for TWR-K21D50M |
| <b>RELEASE DATE:</b>    | July 5 <sup>th</sup> , 2012  |

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Freescale Semiconductor Japan Ltd.  
Headquarters  
ARCO Tower 15F  
1-8-1, Shimo-Meguro, Meguro-ku,  
Tokyo 153-0064  
Japan  
0120 191014 or +81 3 5437 9125  
[support.japan@freescale.com](mailto:support.japan@freescale.com)

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Freescale Semiconductor China Ltd.  
Exchange Building 23F  
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Chaoyang District  
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China  
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Rev. 1  
2/2012

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# 1 Introduction

This release note documents the K21D50M standalone package for Freescale MQX™ RTOS 3.8.0. Freescale K21D50M is a member of the Kinetis Arm Cortex processor family. The software is built base on MQX version 3.8.0. It includes RTOS basic and standard set of peripheral drivers.

For more detailed information about MQX please see Freescale MQX™ 3.8.0 Release notes and Getting started documents.

## 2 Requirements

**This package can be installed and used standalone.**

### 2.1 Development tools

The TWR-K21D50M Package for Freescale MQX 3.8.0 was tested with the following development tools:

- CodeWarrior Development Studio for Microcontrollers Version 10.2 with ARM compiler Service Pack installed (MCU update Version MCU10\_2SP for K21).
  - o Support available for Kinetis and ColdFire devices
  - o See build projects in `cw10` subdirectories
- IAR Embedded Workbench for ARM Version 6.30 or higher
  - o Support available for Kinetis ARM®CortexM4 devices
  - o See build projects in `iar` subdirectories
- KEIL ARM 4.53 or higher
  - o Support available for Kinetis ARM®CortexM4 devices
  - o See build projects in `uv4` subdirectories

### 2.2 System Requirements

The system requirements are defined by the development tool requirements. There are no special host system requirements for hosting the Freescale MQX™ RTOS distribution itself.

### 2.3 Target Requirements

The TWRK21D50M Freescale MQX 3.8 was tested with the following hardware configuration:

- TWR- K21D50M Rev. A processor board
- TWR-SER Rev. C serial board
- TWR-ELEV Primary and Secondary - four-storey elevator boards
- TWR-MEM Rev. B memory extension board

## 3. Features

### 3.1 Key Features

This package brings initial support of TWR-K21D50M platform. Standard set of features and example application is provided.

This section describes the major changes and new features implemented in this release.

Core clock: 48MHz

Bus clock: 48MHz

Default console: ttyc

BSP timer: system tick

#### New MK21D50M support files :

- PSP support for K21D50M platform
- BSP for TWR- K21D50M evaluation kit
- Standard set of I/O drivers supporting the K21D50M peripherals including:
  - ADC driver
  - CRC driver
  - GPIO driver.
  - LWGPIO driver
  - LWADC driver
  - Serial interrupt and polled driver
  - SPI interrupt and polled driver.
  - I2C interrupt and polled driver.
  - Flash Driver
  - RTC Driver.
  - Timer
  - SD card driver
  - Compact Flash Card Driver
- USB Host and Device drivers and stacks.
- Example and demo applications demonstration MQX, USB and MFS usage

### 3.2 Example Applications

MQX 3.8.0 K21D50M standalone package release contains applications demonstrating kernel, peripheral, USB functionality on TWR-K21D50M tower kit. The applications can be found on following location:

- `<install_dir>/mqx/examples` - standard set of examples for kernel features and basic peripheral drivers
- `<install_dir>/mfs/examples` - example applications demonstrating the MFS file system features
- `<install_dir>/usb/host/examples` - examples demonstrating USB Host stack features and class drivers
- `<install_dir>/usb/device/examples` - examples demonstrating USB Device class implementations
- `<install_dir>/demo/` - various demo application showing more complex examples

### 3.3 Unsupported features :

- These modules which are not supported in the current standalone package are listed as below:
  - o Lowpower mode
  - o BSP with Processor Expert enabled.

### 3.4 Release contents

This section gives an overview about the release content.

| Deliverable  | Location                                     |
|--|--|
| <b>Pre-compiled MQX Libraries</b>                  | <install_dir>/lib/...                        |
| MQX PSP Library                                    | .../lib/twrk21d50m.cw10/psp                  |
| MQX BSP Library                                    | .../lib/twrk21d50m.cw10/bsp                  |
| MQX MFS (File System)                              | .../lib/twrk21d50m.cw10/mfs                  |
| MQX USB Libraries                                  | .../lib/twrk21d50m.cw10/usb                  |
| MQX RTCS TCP/IP stack libraries                    | .../lib/twrk21d50m.cw10/rtcs                 |
| MQX Shell Library                                  | .../lib/twrk21d50m.cw10/shell                |
| <b>MQX PSP Source Code and Examples</b>            | <install_dir>/mqx/...                        |
| MQX PSP source code for Cortex                     | .../mqx/source/psp/cortex                    |
| MQX PSP build projects                             | .../mqx/build/cw10/psp_twrk21d50m /...       |
| MQX example applications                           | .../mqx/examples/...                         |
| <b>MQX BSP Source Code</b>                         | <install_dir>/mqx/...                        |
| MQX BSP source code for TWRK21D50M board           | .../mqx/source/bsp/twrk21d50m                |
| MQX BSP build projects                             | .../mqx/build/cw10/bsp_twrk21d50m /...       |
| <b>RTCS Source Code and Examples</b>               | <install_dir>/rtcs/...                       |
| RTCS source code                                   | .../rtcs/source                              |
| RTCS build projects                                | .../rtcs/build/cw10/rtcs_twrk21d50m          |
| RTCS example applications                          | .../rtcs/examples                            |
| <b>USB Host Drivers Source Code and Examples</b>   | <install_dir>/usb/host/...                   |
| USB Host source code and class drivers             | .../usb/host/source                          |
| HUB Class Driver                                   | .../usb/host/source/classes/hub              |
| Human Interface Device (HID) Class Driver          | .../usb/host/source/classes/hid              |
| Mass Storage (MSD) Class Driver                    | .../usb/host/source/classes/msd              |
| Printer Class Driver                               | .../usb/host/source/classes/printer          |
| CDC Class Driver                                   | .../usb/host/source/classes/cdc              |
| USB Host build projects                            | .../usb/host/build/cw10/usb_hdk_twrk21d50m   |
| USB Host example applications                      | .../usb/host/examples                        |
| <b>USB Device Drivers Source Code and Examples</b> | <install_dir>/usb/device/...                 |
| USB Device source code                             | .../usb/device/source                        |
| USB Device build projects                          | .../usb/device/build/cw10/usb_ddk_twrk21d50m |
| USB Device example applications                    | .../usb/device/examples                      |
| <b>Shell Library Source Code</b>                   | <install_dir>/shell/...                      |
| Shell source code                                  | .../shell/source                             |
| Shell build projects                               | .../shell/build/cw10/shell_twrk21d50m        |
| <b>CodeWarrior Support</b>                         | <CodeWarrior_dir>/...                        |
| MQX Task-aware Debugger plug-in for CW10           | <cw10_dir>/MCU/bin/plugins/debugger/rtos     |
| <b>PC Host Tools</b>                               | <install_dir>/tools                          |
| TFS Make Utility                                   | .../tools/mktfs.exe                          |
| Check for Latest Version tool                      | .../tools/webchk.exe                         |
| <b>Documentation</b>                               | <install_dir>/doc                            |

|  |         |
|--|---------|
| User Guides and Reference Manuals for MQX<br>RTOS, RTCS, MFS, IO Drivers, USB etc.<br>RTOS, IO Drivers, etc. | .../doc |
|--|---------|

## 4 Installation Instructions

### 4.1 Installation Guide

Run the K21D50M Package installer and proceed according to instructions. This package can be used independently of the current MQX 3.8.0 folder.

### 4.2 Board-specific information related to TWR-K21D50M

All jumper and other hardware switches not specifically described below are expected in factory default positions. Please refer to the board User's Guide for the default settings.

#### 4.2.1 TWR-K21D50M-KIT

The K21D50M Package supports the following hardware configuration:

- TWR- K21D50M Rev. A processor board
- TWR-SER Rev. C serial board
- TWR-ELEV Primary and Secondary - four-storey elevator boards
- TWR-MEM Rev. B memory extension board.

#### 4.2.2 Important jumper settings

For basic operations, make sure following jumper settings are applied :

- For using Tower USB :
  - o TWR\_K21D50M board, shoot 6-8 on J11
  - o Install R224, R226 on nets USB0\_DP and USB0\_DN and remove R225, R227 on K21\_MICRO\_USB\_DP and K21\_MICRO\_USB\_DN.
- For using Micro USB in K21 tower board :
  - o TWR\_K21D50M board, shoot 5-6 on J11
  - o Leave R225 and R227 on nets K21\_MICRO\_USB\_DP and K21\_MICRO\_USB\_DN and do not populate R224 and R226 on USB0\_DP and USB0\_DN.
- For using USB Host mode, jumpers on position
  - o TWR-SER board, J16 on position 1-2(VB\_HOST)
  - o TWR-SER board, J10 on default position 1-2(USB host)
- For using USB Device mode, jumpers on position
  - o TWR-SER board, J16 on position 3-4(VB\_DEV)
  - o TWR-SER board, J10 on position 2-3(USB device)
- For using UART0 with Primary Elevator ( PTA14 and PTA15 ), jumper J13 on position 2-3

#### 4.2.3 Building procedure

Run the self-extracting K21D50M package installer and proceed according to instructions. The files are installed directly into the specified folder.

PSP and BSP libraries must to be built before using any application or have any change kernel or I/O drivers.

The PSP Platform-specific code from `/mqx/source/psp/cortex` is built together with generic MQX core files. The BSP Board-specific code from `/mqx/source/bsp/twrk21d50m` is built with

I/O driver files from `/mqx/source/bsp/io`.

#### Step1 – Build PSP library

Build project at location: `<install_dir>/mqx/build/cw10/psp_ twrk21d50m`

#### Step2 – Build BSP library

Build project at location: `<install_dir>/mqx/build/cw10/bsp_ twrk21d50m`

#### Step3 – Build applications

MQX 3.8 K21D50M package release contains applications demonstrating kernel, peripherals, TWR-K21D50M tower kit. Refer section 3.2 for applications location.

### 4.2.4 Board-specific build targets:

Internal Flash (Debug and Release) - these targets enable to build applications suitable for booting the system up from Internal Flash memory. After the reset the code will be executed from Internal Flash

## 5 Known issues

### 5.1 Compact Flash card Driver

- Some Compact Flash cards does not work correctly with TWR-MEM and MQX CF Card driver. An issue in the TWR-MEM CPLD code REV A causes incorrect communication with some types of cards (e.g. Kingston). A fixed CPLD firmware is available in `<install_dir>/mqx/source/io/pccard/twr_mem_pccard_cpld/` folder. The firmware can be loaded to the TWR-MEM CPLD using Altera Quartus II design tool and BLASTER connection cable.

### 5.2 Ram target

- Example projects contain different build configurations for code execution from Flash or RAM memory. The RAM-based execution may be faster to debug but not all examples fit into RAM and may fail to link.

### 5.3 Flashing issues in CW 10.2

- K21D50M has issues flashing by J-Link in CW 10.2

## 6 Other notes

- For KEIL ARM Compiler, the libraries are pre-compiled for “Release” target only, “Debug” target need to be compiled before first use.