Freescale MQX™ RTOS 4.1.0 TWR-K22F120M256R GA Release Notes

1 Introduction

These are the Release Notes for the K22F120M256R GA standalone package for Freescale MQX™ RTOS 4.1.0. Freescale PK22FN256VDC belongs to the Kinetis K series processor family of the 32-bit microcontrollers. The software is built based on Freescale MQX RTOS version 4.1.0. It includes the full set of RTOS services and a standard set of peripheral drivers. Prior installation of MQX 4.1.0 is not required to install this package.

For more information, see the *Freescale MQX™ RTOS 4.1.0 Release Notes* (MQXRN) and *Getting Started with Freescale MQX™ RTOS* (MQXGSRTOS).

Contents

1.1 Development tools

The TWR-K22F120M256R release was tested with the following development tools:

- IAR Embedded Workbench® for ARM® Version 7.10.3
  - o Support available for Kinetis ARM Cortex®-M4 devices
  - o See build projects in the `iar` subdirectories

- ARM-MDK - Keil µVision® Version 5.0
  - o Support available for Kinetis ARM Cortex-M4 devices
  - o See build projects in `uv4` subdirectories

- GNU Tools for ARM Embedded Processors version 4.7-2013-q3
  - o Support available for Kinetis and Vybrid devices
  - o Makefile build option: TOOL=gcc_arm

- Makefile support (mingw32-make version 3.8.2)
  - o Library makefiles are located in `<MQX_library_dir>/build/<board>/make`
  - o Application makefiles are located in `<example_dir>/build/make/<board>`

For instructions on setting up development tools, including installing processor support patches, see Section 4 "Other Notes".

1.2 System requirements

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

1.3 Target requirements

The TWR-K22F120M package was tested with the following hardware configurations:

- TWR-K22F120M System module Rev. B with a PK22FN256VDC processor
- TWR-SER serial System module Rev. G
- TWR-SER2 serial System module Rev. D
- TWR-ELEV Primary and Secondary elevator System modules
- TWR-MEM Rev. B memory extension System module

2 Features

2.1 Key features

This package provides support for the TWR-K22F120M tower system module with a PK22FN256VDC processor and a standard set of features and example applications.

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

- Core clock:120 MHz (High Speed Run mode, default)
- Bus clock: 60 MHz (High Speed Run mode, default)
- BSP Timer: SysTick
- Default console: ttyb (OpenSDA)

The package supports these features:

- PSP support for the PK22FN256VDC Microcontroller
- BSP for the TWR-K22F120M tower system module with a PK22FN256VDC processor
- Standard set of I/O drivers supporting the K22F120M256R peripherals including:
  - LWGPI/O driver
  - Serial interrupt and polled driver
  - DMI SPI driver
  - I2C interrupt and polled driver
  - ADC
  - LWADC
  - Flash Driver
  - RTC Driver
  - PIT Timer
  - LPT Timer
  - RNGA
  - SAI
  - SD Card based SPI driver
- USB Device, Host and OTG drivers and stacks
- Example and demo applications demonstrating the Freescale MQX RTOS, USB and MFS usage
- MFS file system

- Shell command line interface

2.2 Limitations

This release does not support this feature:

- CodeWarrior v10

2.3 Example applications

This package contains applications demonstrating kernel, peripheral, and file system on the TWR-K22F120M Tower System kit. The applications can be found at the following locations:

- `<install_dir>/mqx/examples`: standard set of examples for kernel features and basic peripheral drivers

- `<install_dir>/usb_v2/example`: examples demonstrating USB stack features and class drivers

- `<install_dir>/mfs/examples`: example applications demonstrating the MFS file system features

2.4 Release contents

This section provides an overview of the release content.

Deliverable	Location
MQX PSP Source Code and Examples	<install_dir>/mqx/...
MQX PSP source code for Kinetis	.../mqx/source/psp/cortex_m
MQX PSP build projects	.../mqx/build/<compiler>/psp_twrk22f120m256r/…
MQX example applications	.../mqx/examples/...
MQX BSP Source Code	<install_dir>/mqx/...
MQX BSP source code for TWR-K22F120M board	.../mqx/source/bsp/twrk22f120m256r
MQX BSP build projects	../mqx/build/<compiler>/bsp_twrk22f120m256r/…
USB Host Drivers Source Code and Examples	<install_dir>/usb_v2/usb_core/host/...
USB Host source code and class drivers	.../usb_v2/usb_core/host /source
HUB Class Driver	../usb_v2/usb_core/host/source/classes/hub
Human Interface Device (HID) Class Driver	.../usb_v2/usb_core/host/source/classes/hid
Mass Storage (MSD) Class Driver	.../usb_v2/usb_core/host/source/classes/msd
Communications Device Class (CDC) Class Driver	.../usb_v2/usb_core/host/source/classes/cdc
USB Host build projects	.../usb_v2/usb_core/host/build/<compiler>/usbh_mqx_twrk22f120m256r
USB Host example applications	.../usb_v2/example/host
USB Device Drivers Source Code and Examples	<install_dir>/usb_v2/usb_core/device/...
USB Device source code	.../usb_v2/usb_core/device/source
USB Device build projects	.../usb_v2/usb_core/device/build/<compiler>/usbd_mqx_twrk22f120m256r
USB Device example applications	.../usb_v2/example/device
USB OTG Drivers Source Code and Examples	<install_dir>/usb_v2/usb_core/otg/...
USB OTG source code	.../usb_v2/usb_core/otg/source
USB OTG build projects	.../usb_v2/usb_core/otg/build/<compiler>/usbd_mqx_twrk22f120m256r
USB OTG example applications	.../usb_v2/example/otg
Shell Library Source Code	<install_dir>/shell/...
Shell source code	.../shell/source
Shell build projects	.../shell/build/<compiler>/shell_twrk22f120m256r
PC Host Tools	<install_dir>/tools
TFS Make Utility	…/tools/mktfs.exe
Check for Latest Version tool	…/tools/webchk.exe
Documentation	<install_dir>/doc
User Guides and Reference Manuals for MQX RTOS, MFS, IO Drivers, USB, etc.	…/doc

3   Installation Instructions

3.1   Installation guide

Run the TWR-K22F120M package installer and proceed according to instructions. This package can be used independently of the current MQX 4.1.0 folder.

3.1.1   Build procedure

For build procedures, see the *Getting Started with Freescale MQX™ RTOS* (MQXGSRTOS).

3.1.2   Default jumper settings

These are the default jumper settings for TWR-K22F120M standalone operation:

- J18, J37, J36, J10, J7, J9, J17, J12, J15, J28, J26 on
- J21, J13, J11, J38, J34, J33 off
- J29, J30, J35 on position 2-3
- J27, J19, J22 on position 1-2
- J16 1-2, 3-4, 5-6, 7-8

3.1.3   Important jumper settings

For basic operations, ensure that the following jumper settings are applied:

- For USB:
    - J4 1-2: enables the P3V3_VOUT.
    - J26 1-2: enables 5V VBUS for the Host mode.

    For TWR-K22F120M board rev. A:
    - J27 1-2: uses the mini USB receptacle on the TWR-SER board.
    - J27 2-3: uses the micro USB receptacle on the TWR-K22F120M board.

    For TWR-K22F120M board rev. B or later:
    - J27 1-2: uses the micro USB receptacle on the TWR-K22F120M board.
    - J27 2-3: uses the mini USB receptacle on the TWR-SER board.

3.1.4   Board-specific build targets

Internal Flash (Debug and Release): These targets enable building applications suitable for booting the system from the Internal Flash memory. After reset, the code is executed from the Internal Flash.

4 Other Notes

4.1 Keil (Uv4) patch

Because the Keil version 5.00 does not support the K22F120M 256R device, a patch is required for this device. Select the J-LINK/J-Trace Cortex as the debug tool on the **Debug** tab of the **Options for Target** window.

1. Install the patch by following the installer instructions:

   `<install_dir>/tools/keil_extensions/uVision4/Keil.Kinetis_K20_DFP.1.0.2.pack`

2. Add the target MKXX 256kB Prog Flash to the J_LINK/J-Trace driver setting.

3. In the **Operating system** text box of the **Target** tab, select **Freescale MQX**, and then click **OK**.

4.2 Lwgpio example

The lwgpio example has been moved to the gpio directory. The old POSIX IO GPIO example was removed, because the driver is no longer supported.

4.3 FlexBus

Because K22F120M256R does not have the FlexBus module, please ignore any warning messages related to FlexBus.

5 Known Issues

- Because of the insufficient clock accuracy of CSTCE8M00G55-R0 on the TWR-K22F120M board, there is noise when the audio example (including USB audio example) is running.

- The sai_dma_demo is not working with "record" feature because small RAM size.

- The sai_dma_demo may not work properly with the `play` command in some configurations due to the memory alignment issue. This will be fixed in the upcoming version.

- USB

  o The TWR-SER2 board is not tested.

  o The installation folder of the GCC Tool Chain needs to be modified to the correct path manually by the customer. Otherwise, the GCC tool chain cannot work.

  o The GCC Tool Chain is only verified on the Windows 7 system, not verified on any other systems.

  o All the examples on Keil only have the Flash target version, no RAM target version provided.

  o External power supply of HUB must be provided before it can be used.

o The installation folder name of the release package cannot contain blank spaces. Otherwise, the GCC Tool chain will fail to get the correct path of source files and fail to compile.

o There is a post build for USB library generation, which intends to copy the header files and binary library file to the OUTPUT folder. If the USB stack is installed to a deep folder, this copy operation may fail because of the 260 characters limitation of command line on Windows, and then you get a build error. Please keep the root folder name of USB stack as short as possible to avoid this issue.

o Parsing HID report descriptor is not implemented in all the HID examples of USB Host. The key mapping of some HID devices may not be correct and the key mapping for Audio volume control of some Audio devices may not be correct.

o Because the speed of SPI driver is not high enough, there are noises when the USB audio host example is running.

o The usb_host/microphone example test fails when the USB microphone device is plugged out and the `record` command is executing. The root cause is that when the device is detached, the audio timer is still working and it blocks updating the state of host to detached, so it continues to receive the data.