

# Kinetis Updater User's Guide

## Contents

## 1 Introduction

The Kinetis Updater is a Windows® OS application used to write user application firmware to a Kinetis device's non-volatile memory. The Kinetis device, running the Kinetis bootloader application, communicates with the Kinetis Updater running on a Windows OS PC.

Features:

- Supports Kinetis devices with Kinetis ROM bootloader or running Flash resident bootloader
- Supports UART with a baud rate ranging from 9600 to 128000.
- Supports USB-HID.
- Supports binary file.
- Connects the device automatically when it is available.
- Auto detects new USB-HID or UART devices that are plugged in.

This document describes the function of the various user interface pages that constitute the Kinetis Updater and how to navigate between them.

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## 2 Requirements

**Table 1. Requirements**

Component	Requirement
Computer and processor	1 gigahertz (GHz) or faster x86 or x64 processor
Memory	1 GB RAM (32-bit); 2 GB RAM (64-bit)
Operating system	Windows OS <sup>®</sup> 7, Windows <sup>®</sup> OS 8, Windows <sup>®</sup> OS 8.1
.NET version	4.5 (included in Windows <sup>®</sup> OS 8)
Other	Visual C++ Redistributable Packages for Microsoft Visual Studio <sup>®</sup> 2013. Select vcredist_x86.exe at the prompt.

**NOTE**

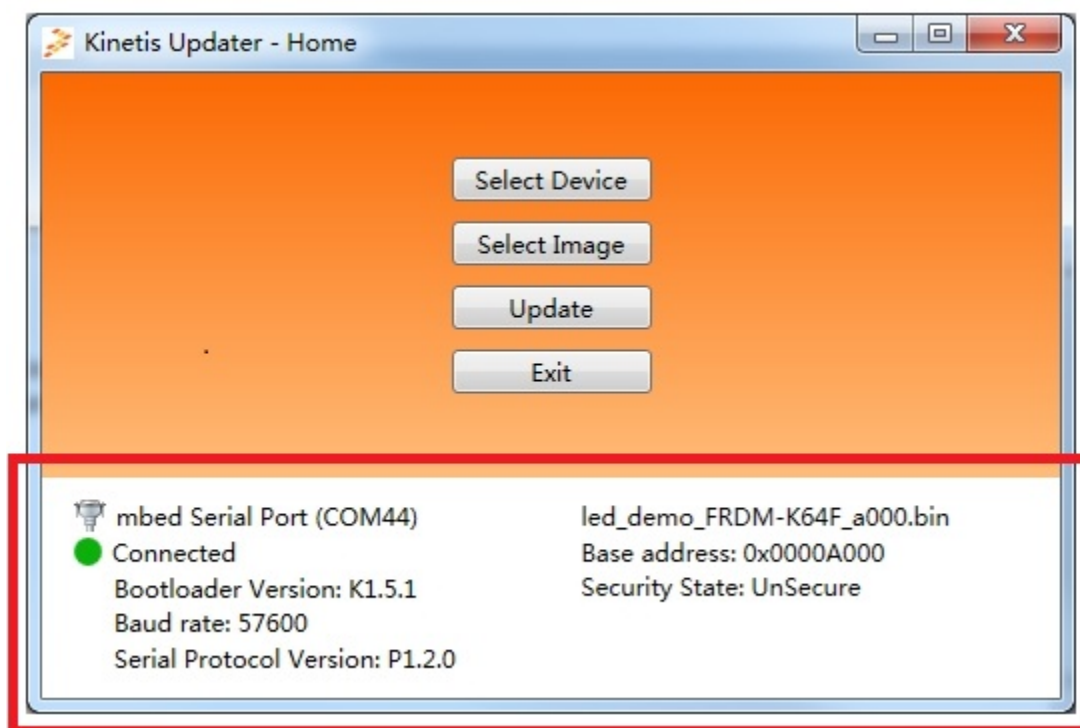
1. Microsoft .NET Framework 4.5 needs to be installed before running Kinetis Updater.
2. Kinetis Updater doesn't support Windows<sup>®</sup> OS XP.

## 3 The Kinetis Updater user interface

This section describes the various UI pages presented by the Kinetis Updater to gather information necessary to write a firmware image to a Kinetis device running the Kinetis bootloader.

### 3.1 Main window

The main window consists mostly of the grey area under the brightly colored UI pages. The information displayed in the main window area is always present regardless of which UI page is displayed.



**Figure 1. Main window**

The information shown in the main window is arranged in two columns. The left-hand column displays information about the selected device, and the right-hand column displays information about the selected application image and the target device's security state. The green light in the left-hand column means the Kinetis Updater connects to the target device, while the red one means that the Kientis Updater is not connected to the target device. The fields displayed in the main window area are described in more detail in the device configuration page and image configuration page sections below.

#### NOTE

The information about the target device can be displayed only when the Kinetis Updater connects to a target device.

## 3.2 Home page

The home page is the first UI page presented to the user. It provides links to configuration and update tasks.

Once a task page is selected on the home page, the requested page is presented. The user must click the "Home" button in the top right hand corner of the task page to return to the home page in order to choose a different task. Pressing the "Esc" key or the "Enter" key on a task page also returns the user to the Home page. The title bar shows the navigation path from home.

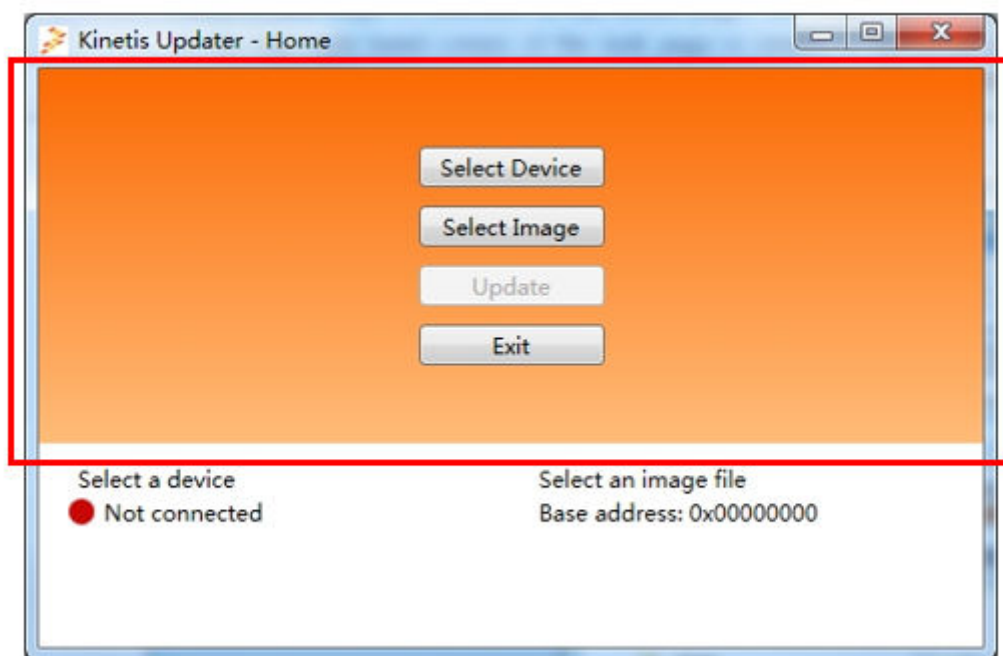


Figure 2. Home page

### 3.2.1 Select Device button

Navigate to the device configuration page.

### 3.2.2 Select Image button

Navigate to the image configuration page.

### 3.2.3 Update button

Navigate to the Update page. The "Update" button is disabled until these conditions are met:

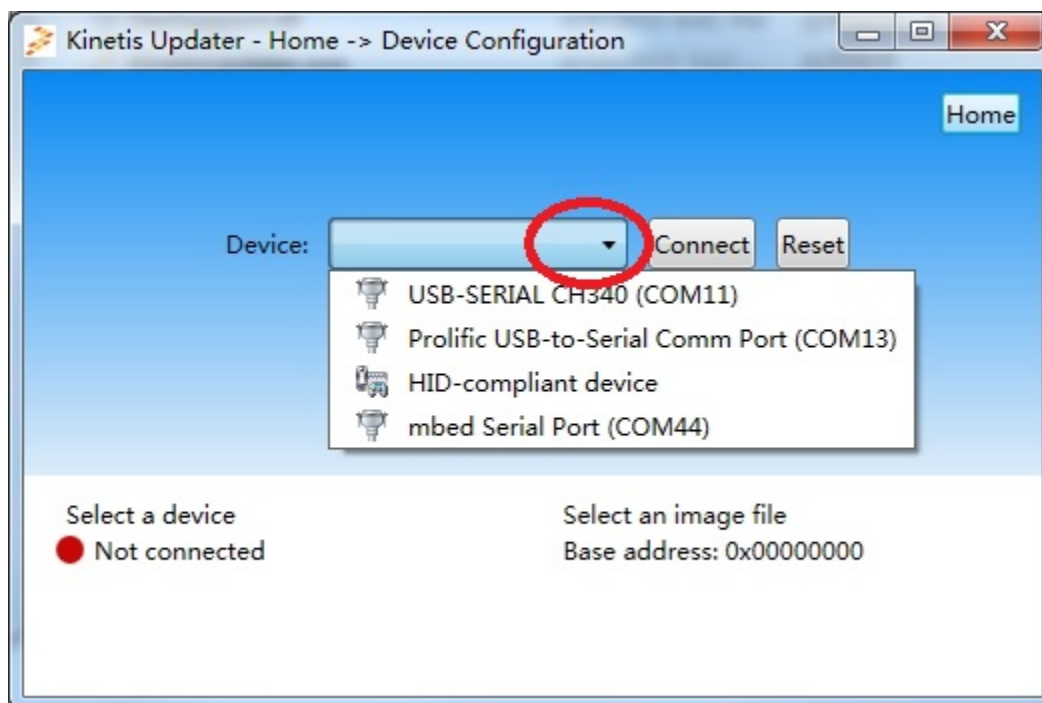
- A device is selected and a connection to the Kinetis bootloader is established.
- An application image is selected.

### 3.2.4 Exit button

Close the Kinetis Updater application.

### 3.3 Device configuration page

The device configuration page is used to select the device that the application image writes to. Open the device selection combo box to see a list of supported devices connected to the computer.



**Figure 3. Device configuration page**

#### 3.3.1 Device selection combobox

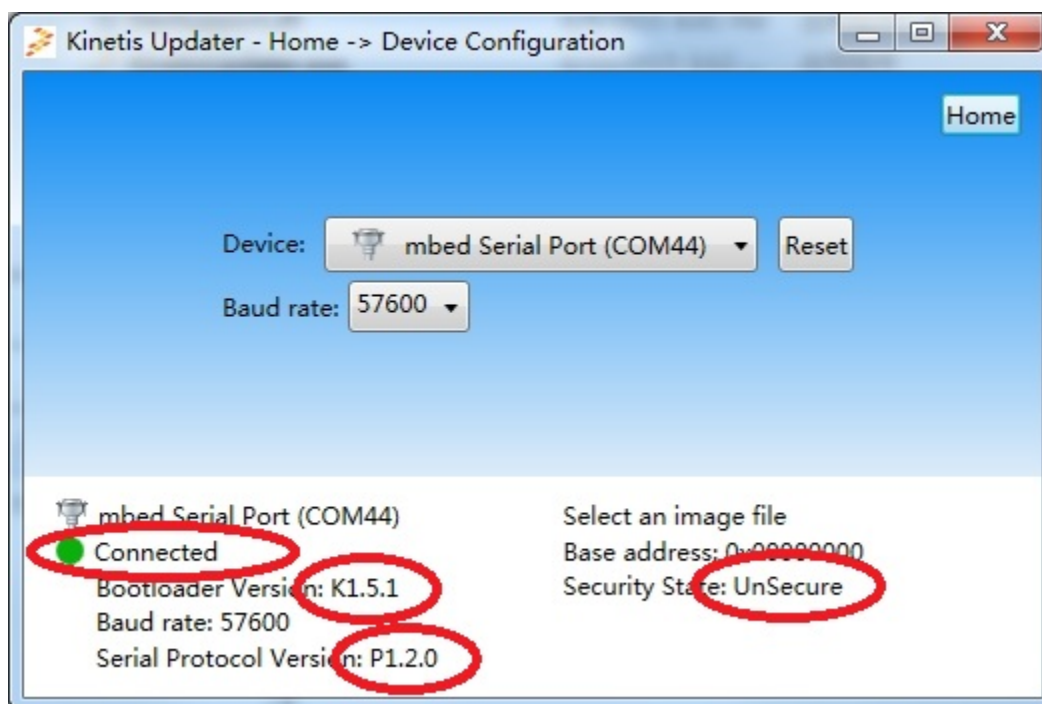
Lists all devices capable of running the Kinetis bootloader. This includes all serial ports as well as USB-HID devices with vendor and product IDs equal to 0x15A2 and 0x0073 respectively.

Kinetis Updater also updates the combobox when a new serial device or USB-HID device arrives. The User does not need to restart the program.

#### NOTE

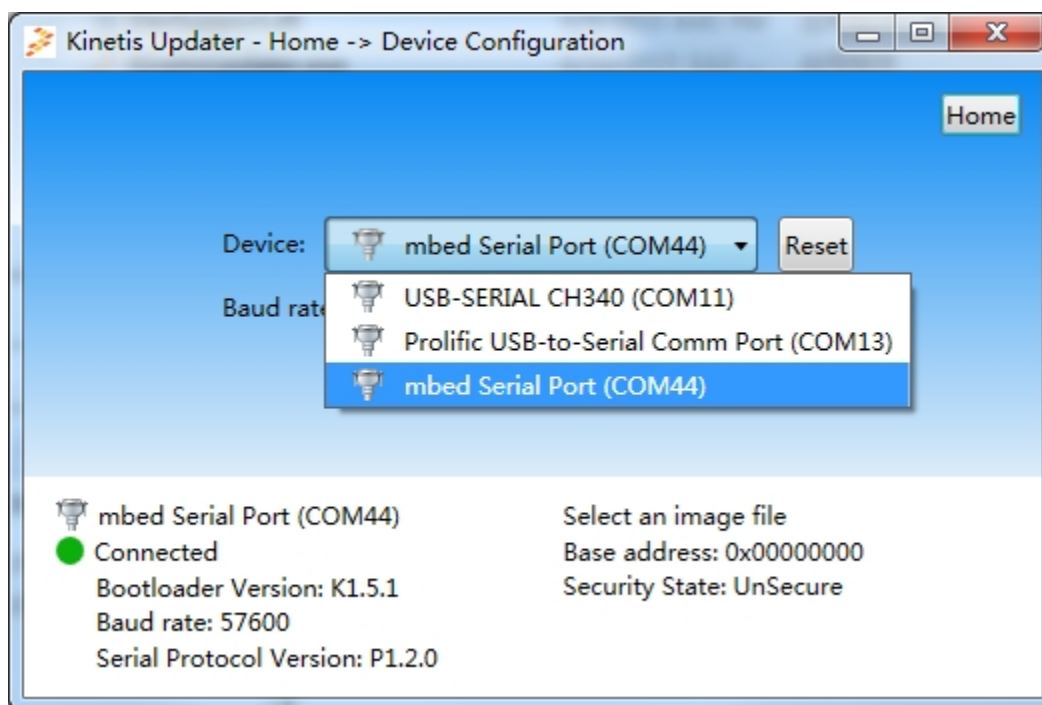
1. Kinetis Updater does not support the USB-HID device with other vendor and product IDs except 0x15A2 and 0x0073.
2. Kinetis Updater cannot recognize multiple USB-HID devices with 0x15A2 and 0x0073. Connect only one USB-HID device to the host at a time.

Once a device is selected in the drop-down list, the application sends a get-property command to retrieve the Kinetis bootloader version number and MCU security state. For a device connected to a serial port, the serial protocol version number is also retrieved.



**Figure 4. Device configuration page - connected**

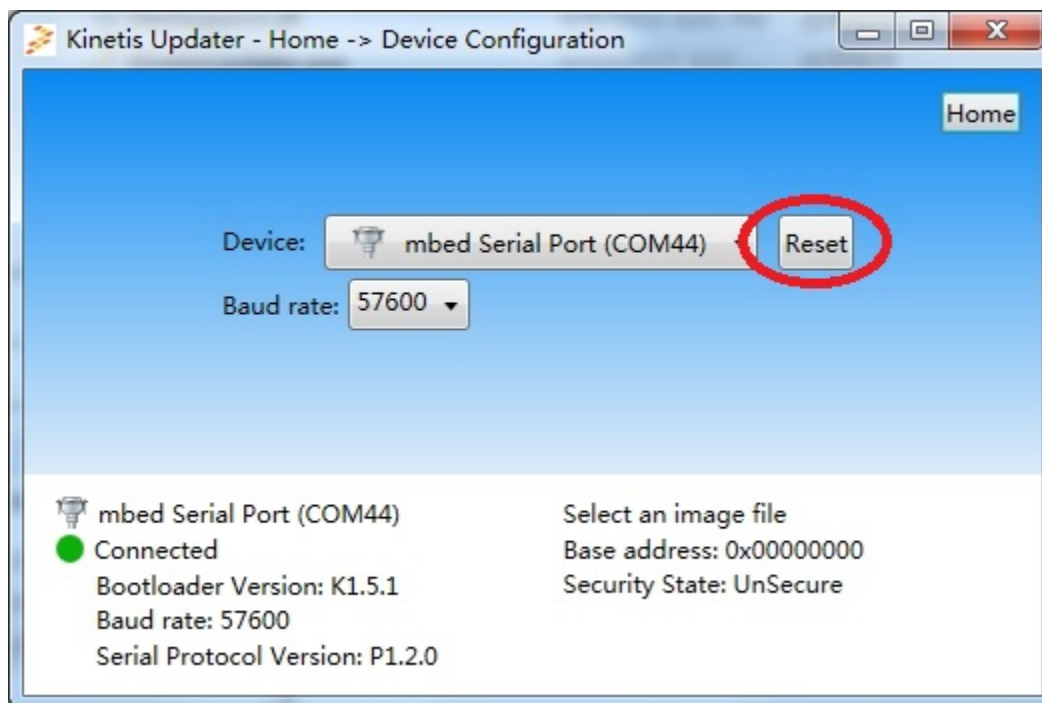
Sending the get-property command sets the selected peripheral as active in the Kinetis bootloader, which shuts down other peripherals on the selected device. The USB-HID port is removed from the combobox.



**Figure 5. Example: USB-HID interface not available after serial communication established**

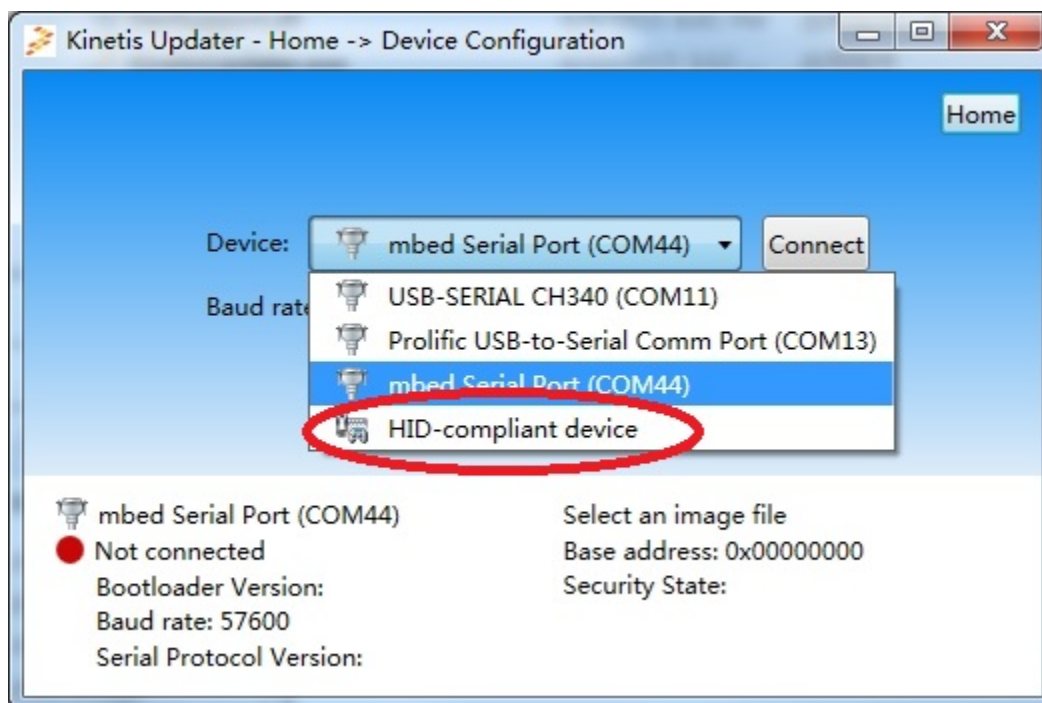
### 3.3.2 Reset button

Sends the reset command to the Kinetis bootloader. This control is hidden until communication to a Kinetis bootloader is established.



**Figure 6. Device configuration page - reset**

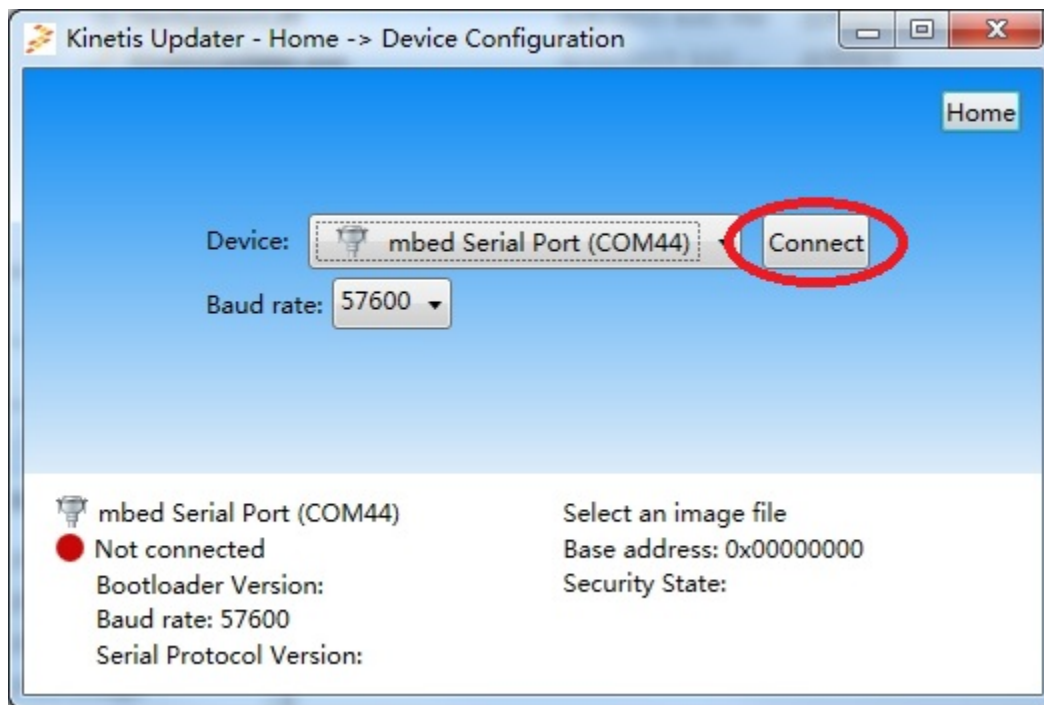
Sending the reset command disconnects the current device selection and put the Kinetis bootloader back in the get-active-peripheral state, where all peripherals are again enabled and able to be selected.



**Figure 7. Example: Device configuration page - USB available after reset**

### 3.3.3 Connect button

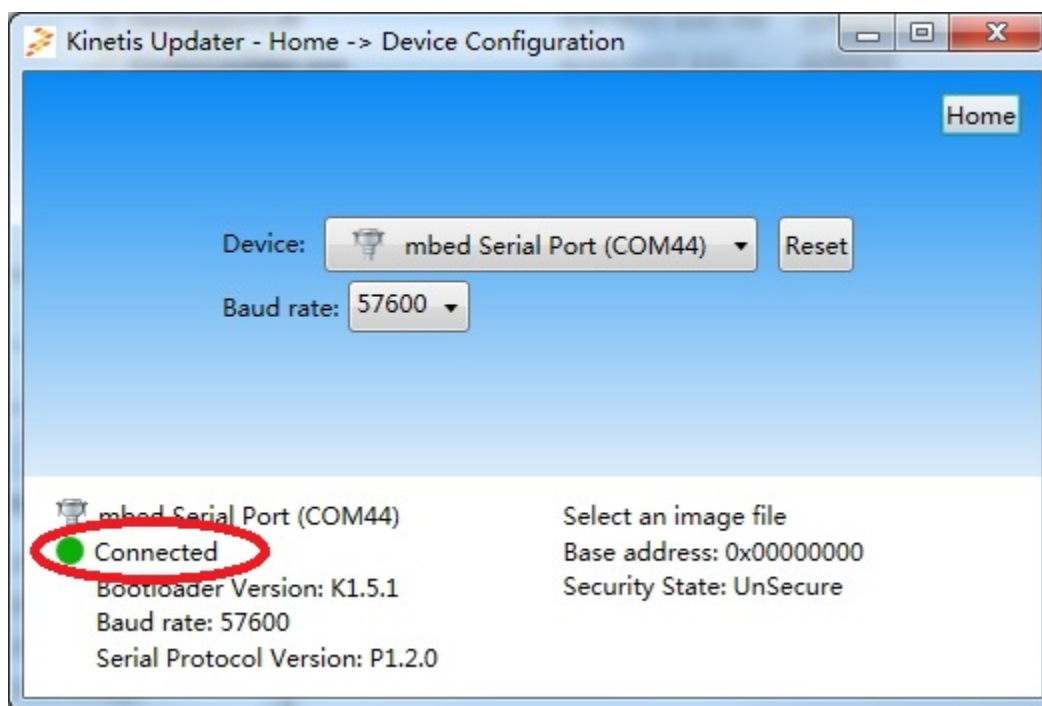
Sends a get-property command to the Kinetis bootloader via the current selected peripheral. This button is visible only when no communication is established.



**Figure 8. Device configuration page - connect**

Sending a get-property command tries to reestablish the communication to the Kinetis bootloader. Once the communication is established, this sets the selected peripheral as active in the Kinetis bootloader, and shuts down other peripherals.

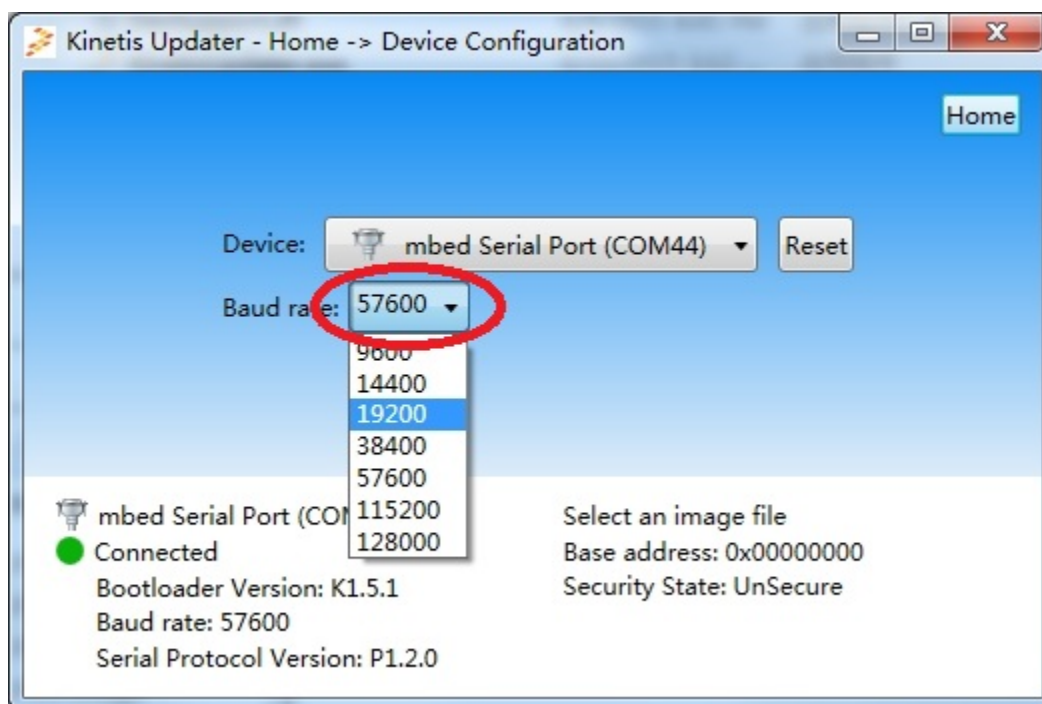




**Figure 9. Example: Device configuration page - reconnect the bootloader**

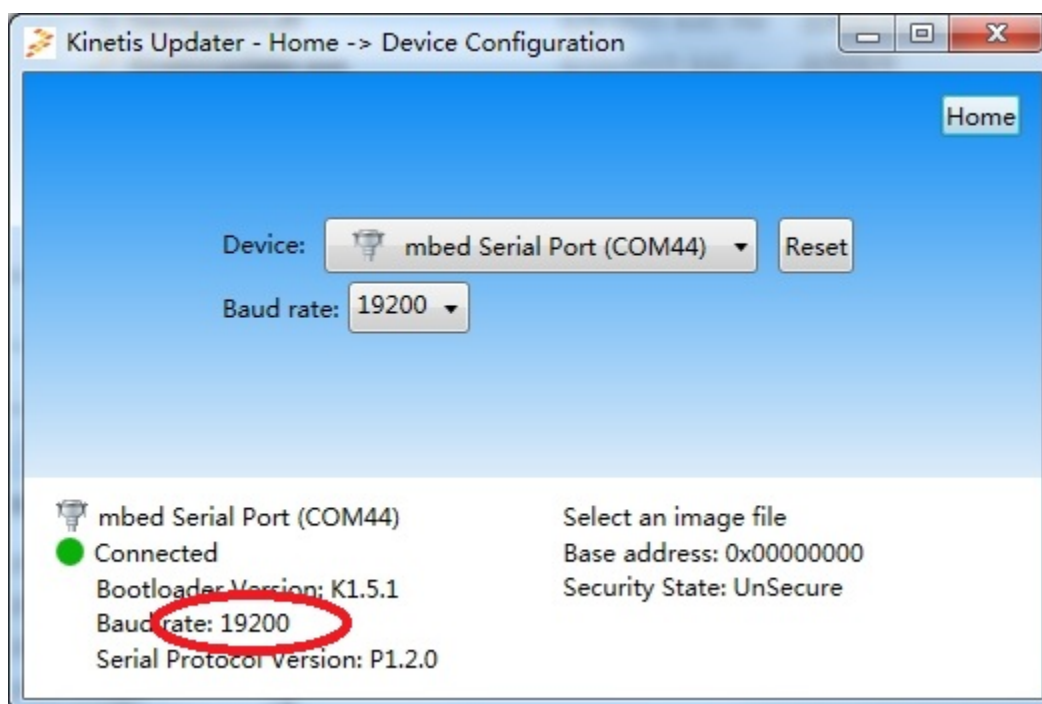
### 3.3.4 Baud rate combobox

The baud rate combobox is displayed for serial port connections as a means for changing the speed of the serial connection. The default baud rate is 57600, and the currently selected value is displayed in the left hand column of the main window area. The baud rate combobox is hidden when USB is selected.



**Figure 10. Device configuration page - serial port device - select baud rate**

If the communication is established, changing the baud rate sends a reset command to set the Kinetis bootloader back in the get-active-peripheral state, then sends a get-property command to reestablish the communication using the new baud rate. The Kinetis bootloader automatically detects the baud rate of the serial port during the initial communication with the application.

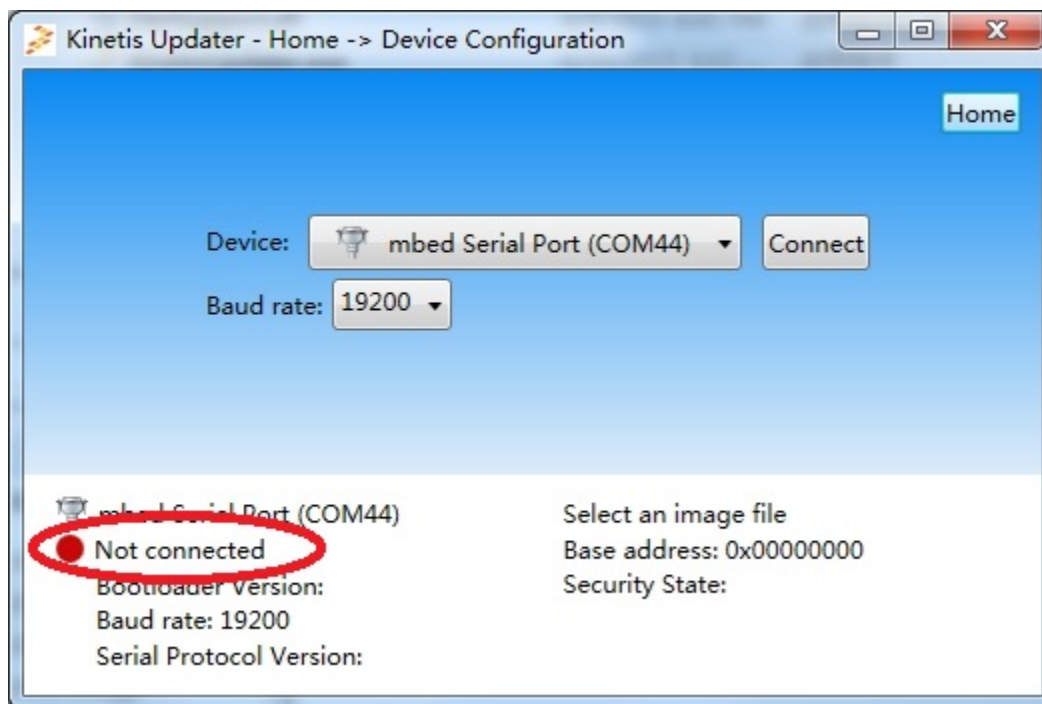


**Figure 11. Main window - serial port device - current baud rate**

If the current communication is not established, changing the baud rate does not send any commands. The user has to press the "Connect" button to set up communication.

**NOTE**

If there is a user application that would normally be launched after reset, changing the baud rate does not establish the communication.



**Figure 12. Changing baud rate without established communication**

### 3.3.5 Home button

Click the "Home" button to navigate back to the home page.

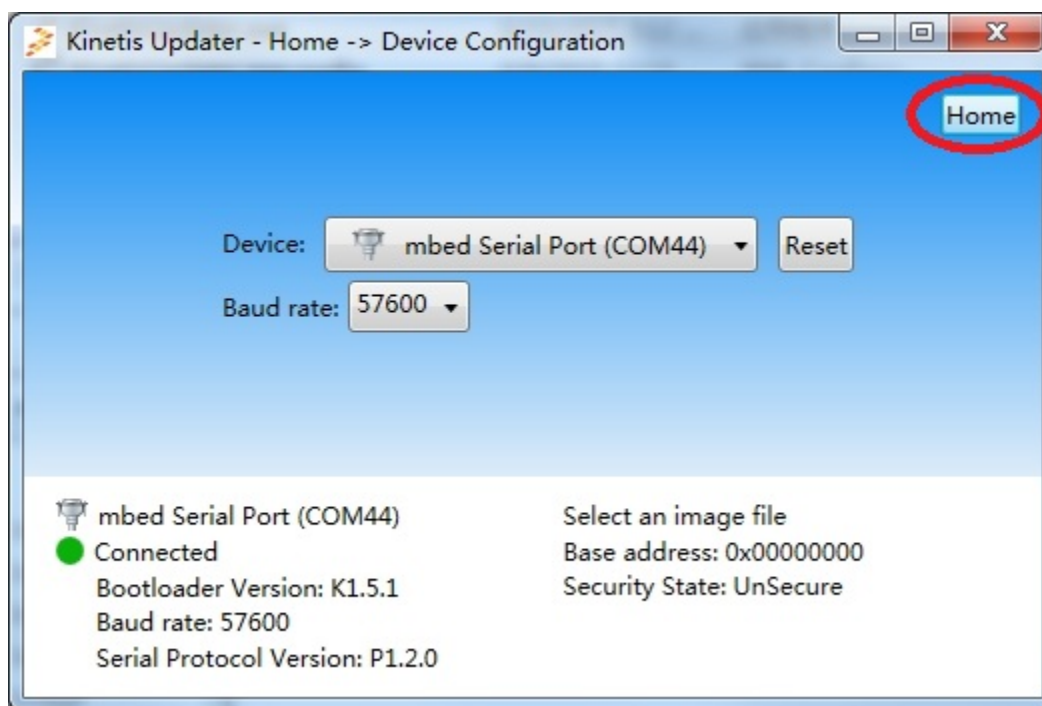


Figure 13. Navigate home

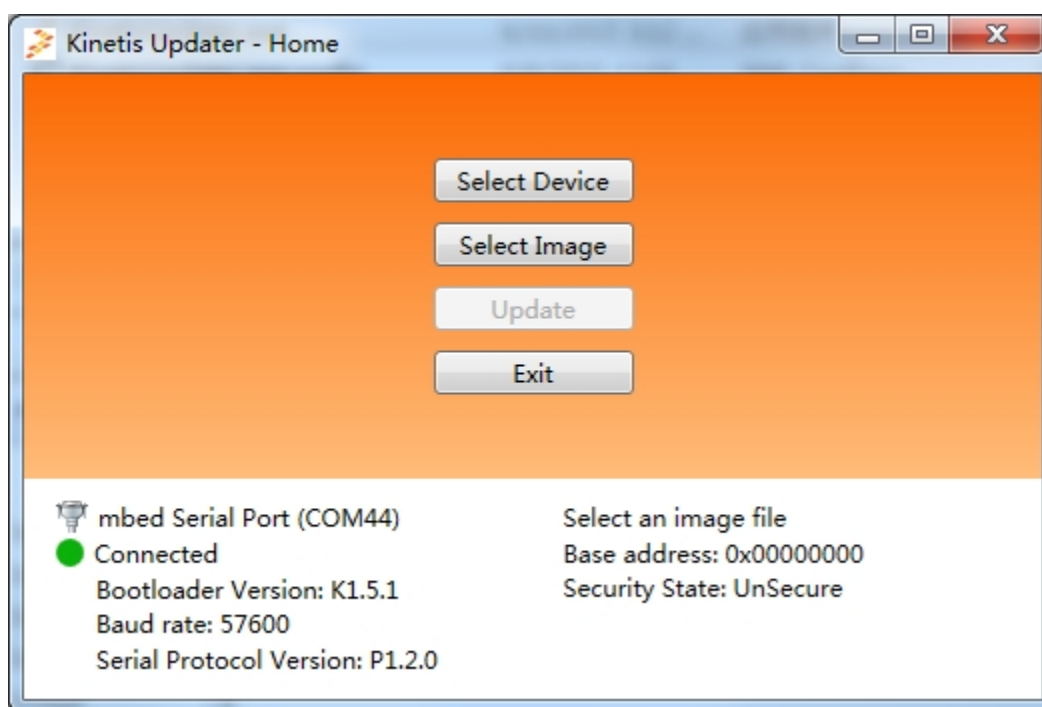


Figure 14. Home page after selecting a device

### 3.4 Image configuration page

The image configuration page is used to specify the application image that is written to the device.

### 3.4.1 Browse button

Click the "Browse" button to locate the application image that is written to the Kinetis device. Currently, the only file type supported by the Kinetis Updater is binary (.bin).

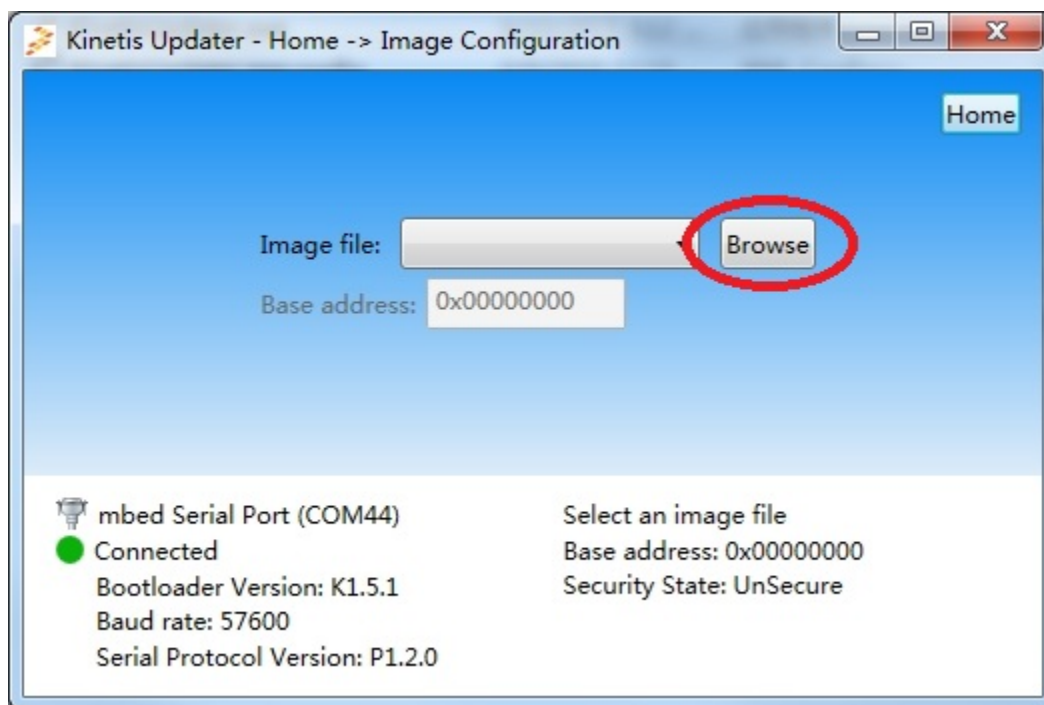


Figure 15. Browse button

### 3.4.2 Image file history combobox

The image file history combobox displays the currently selected application image filename. The drop-down list portion of the control holds the 10 most recently used full path filenames for convenience. The current image filename is also displayed in the right hand column of the main window. The full path filename can be displayed as a tooltip by hovering over either short filename control.

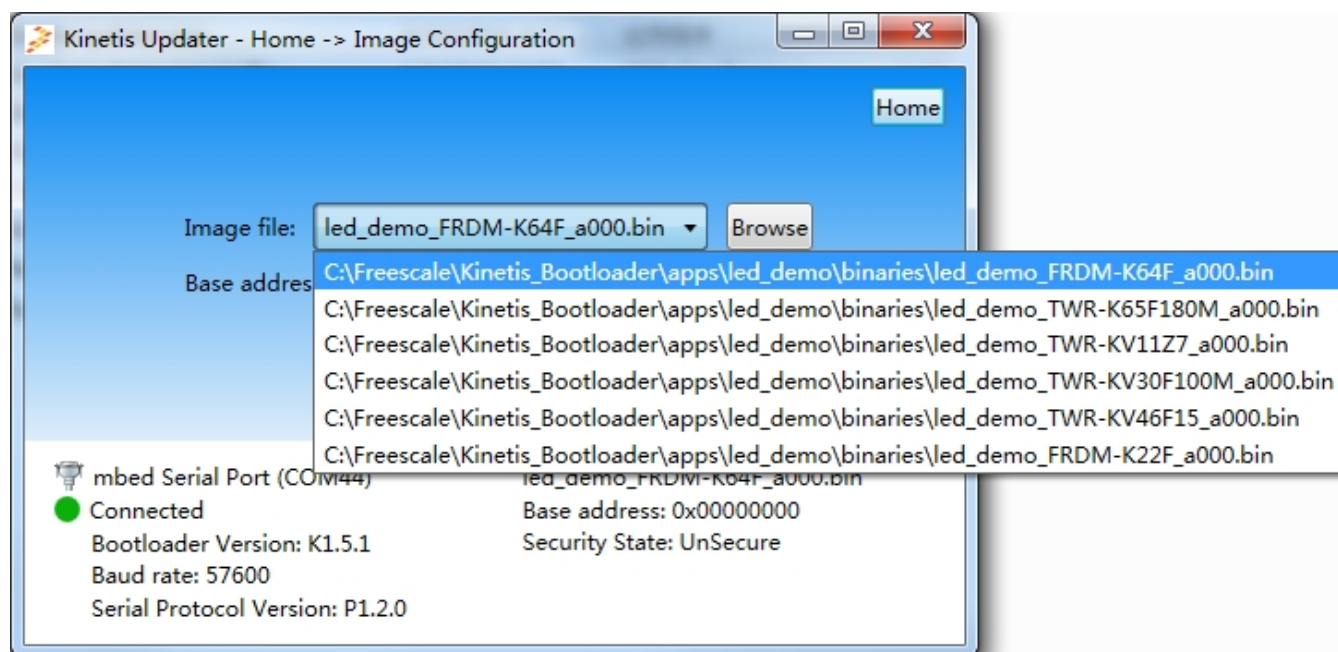


Figure 16. Image configuration page history

### 3.4.3 Base address textbox

Since the binary file type does not contain location information, the address where the image should be placed in flash needs to be entered in the base address textbox. The textbox value is stored as the base address when the focus leaves the textbox control (by clicking "Tab" for instance). Once the value is stored by the application, it is displayed in the right hand column of the main window area as well.

The value that should be used for the base address depends on the device and implementation of the Kinetis bootloader.

The base address should be 0 for ROM and flashloader implementations of the Kinetis bootloader.

For flash-resident implementations of the Kinetis bootloader, the base address is determined by the `BL_APP_VECTOR_TABLE_ADDRESS` definition in the `bootloader_config.h` file for the Kinetis bootloader implementation of the selected device.

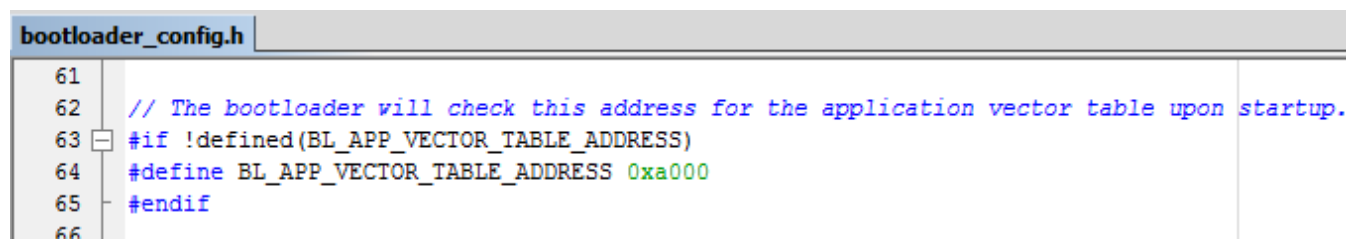


Figure 17. Base address value from Kinetis bootloader - bootloader\_config.h

#### NOTE

The user application written to the Kinetis device must be linked so the vector table is located at the base address value.



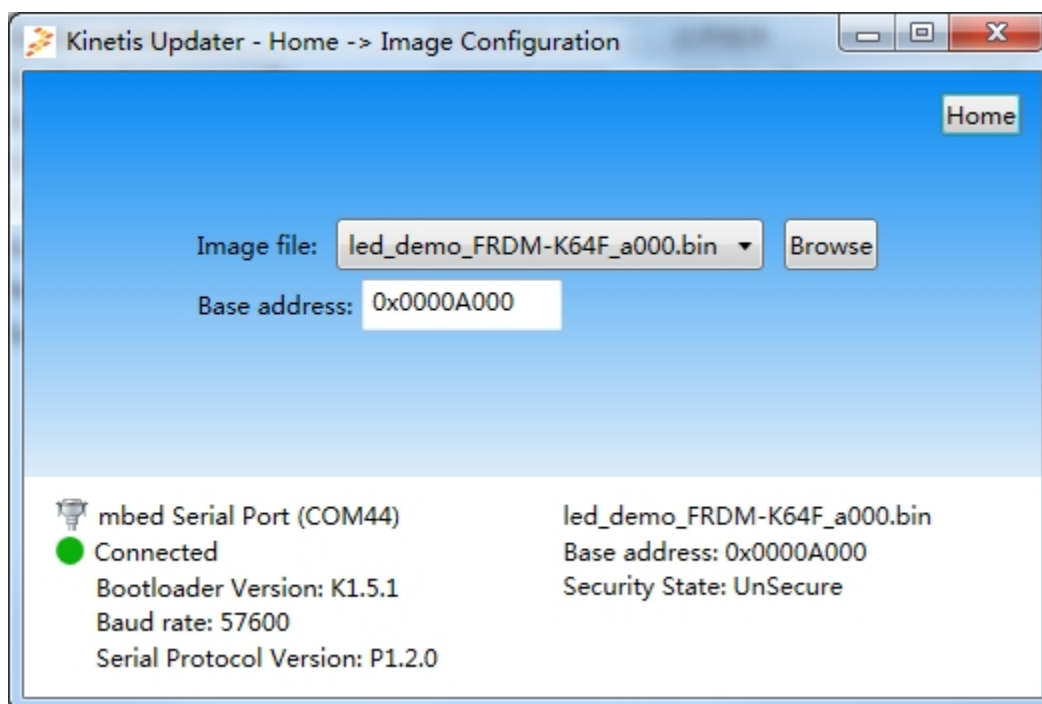


Figure 18. Image configuration page - enter base address

### 3.4.4 Home button

Click the "Home" button to navigate back to the home page.

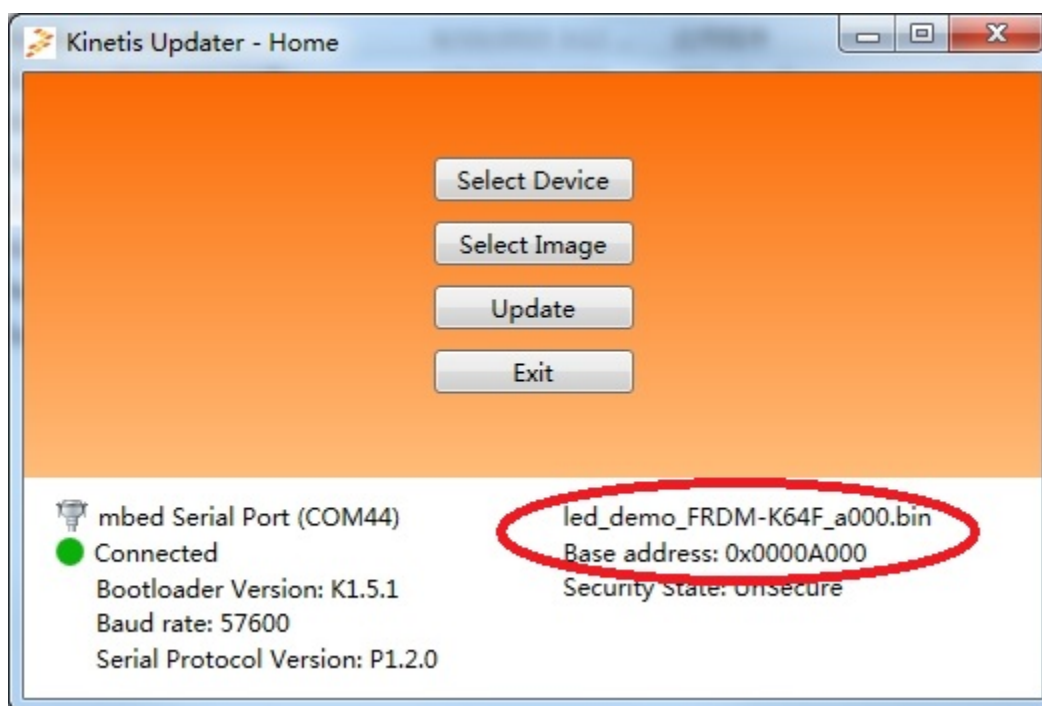
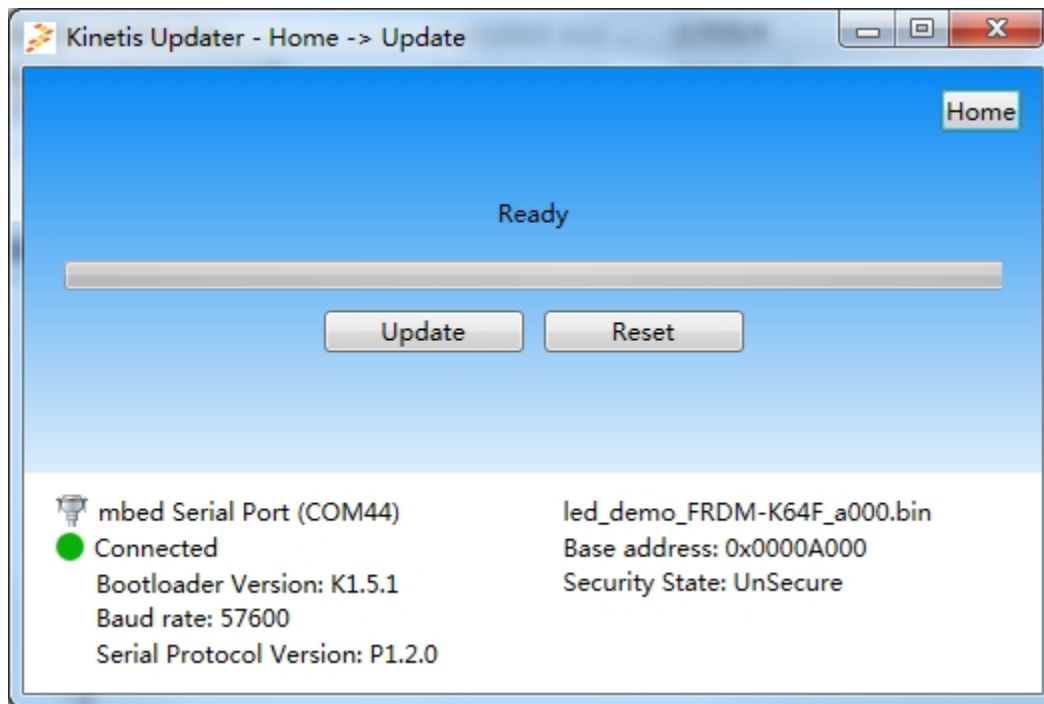


Figure 19. Home page after configuring the application image

## 3.5 Update page

The update page is used to launch the update process that writes the application image to the device.



**Figure 20. Ready to write image to device**

### 3.5.1 Update status

Displays the status of the update process. Errors are displayed in red, and successful completion is displayed in green.

### 3.5.2 Update progress bar

Displays the progress of the update process.

### 3.5.3 Update button

Click the "Update" button to start the update process. The update process consists of these steps:

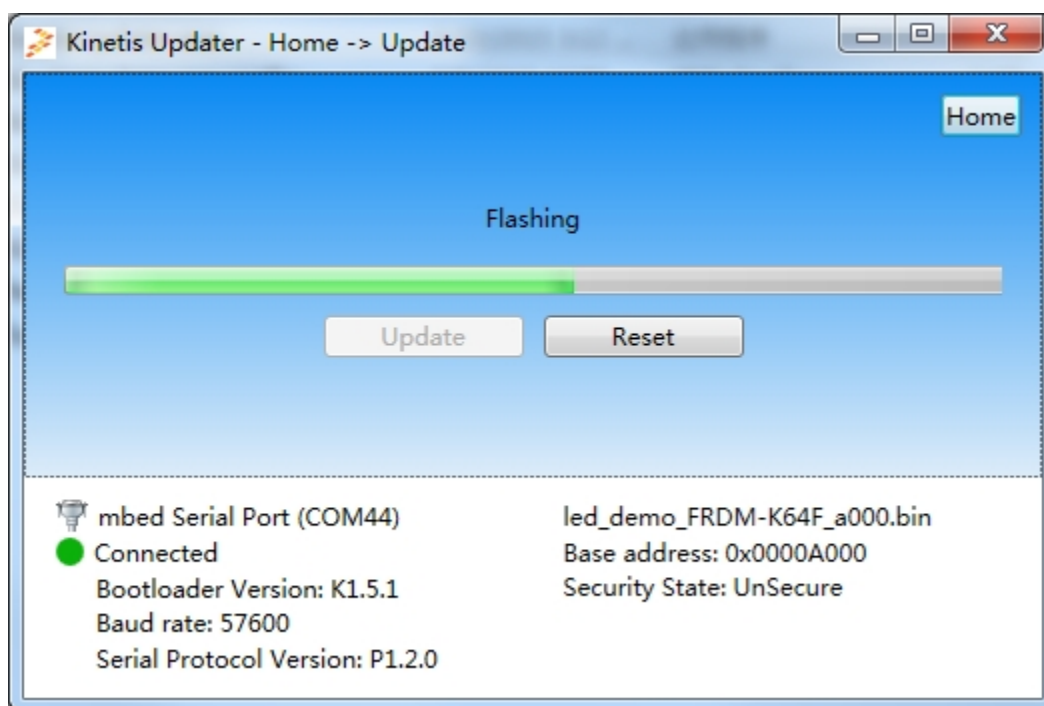
- Erase the region of flash starting at the base address, with a length equal to the size of the application image file using the flash-erase-region command.



**NOTE**

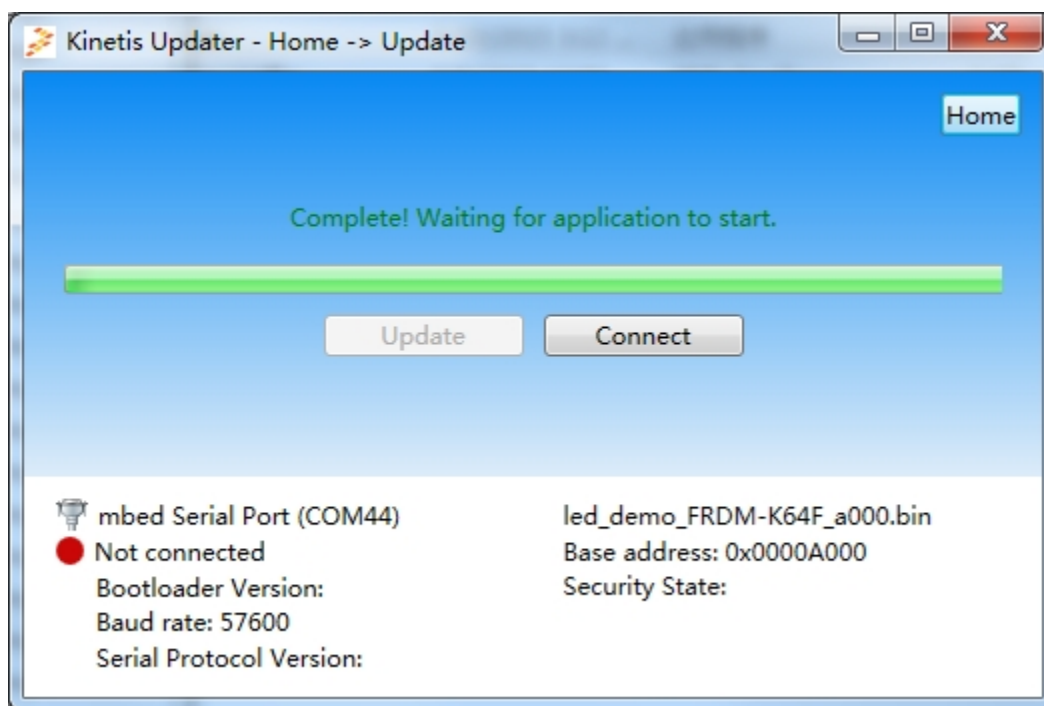
Flash is erased on sector boundaries so the amount erased may be more than the size of the image.

- Write the application image to the base address of the Kinetis device flash using the write-memory command.



**Figure 21. Write application image to device**

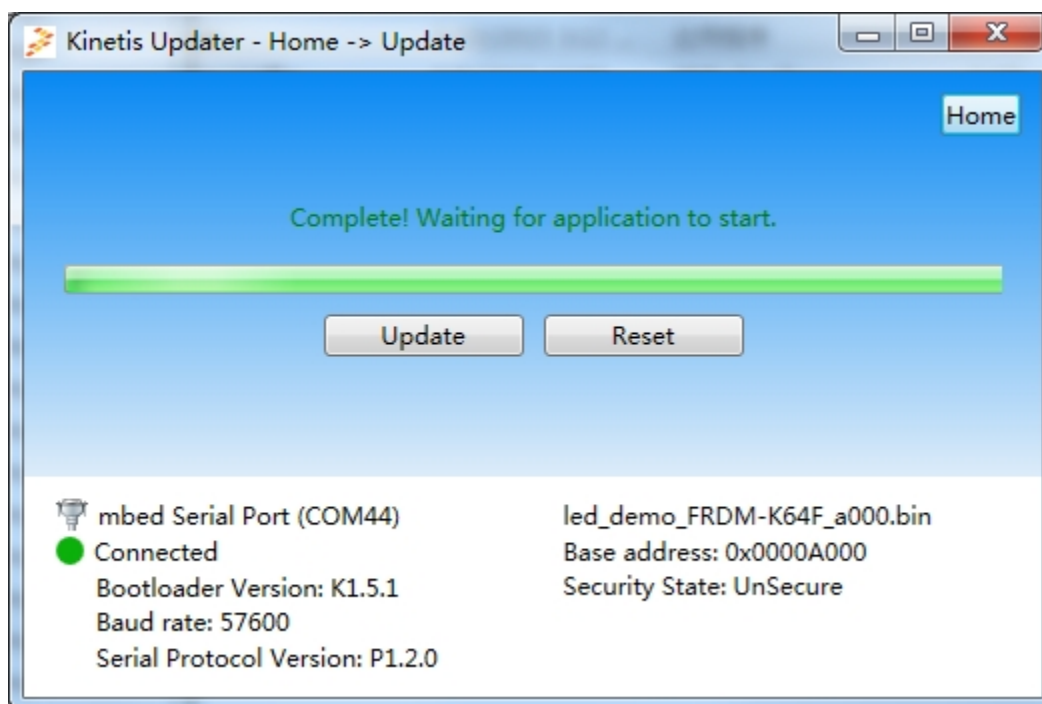
- Reset the device with the reset command. This causes the Kinetis device to disconnect from the computer.



**Figure 22. Application image successfully written to device**

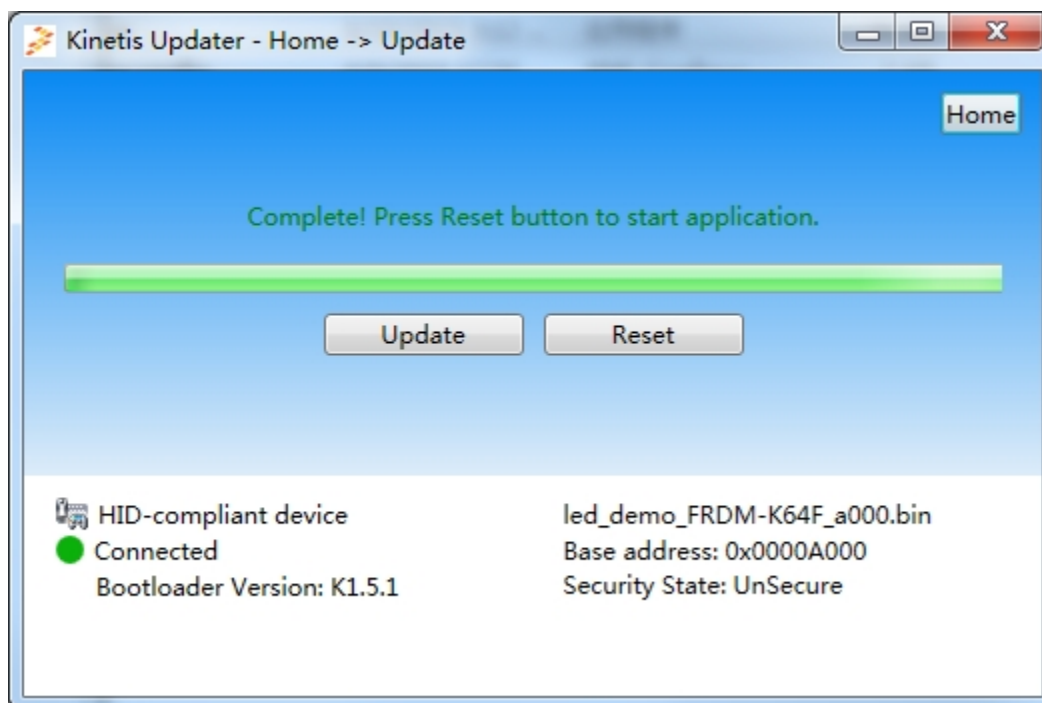
## The Kinetis Updater user interface

- After issuing the reset command, if UART was used for download, the Kinetis Updater waits for 10 seconds for the user to reset the device or plug another device for a subsequent update.



**Figure 23. Communication reestablished**

- After issuing the reset command, if USB was used for the download, the Kinetis Updater waits for another USB-HID connection for subsequent updates.



**Figure 24. Successful update using USB-HID**

### 3.5.4 Security radio button

Offers two safety way for the user to program the Kinetis device in the secure state. The security radio buttons are hidden in the unsecure state.

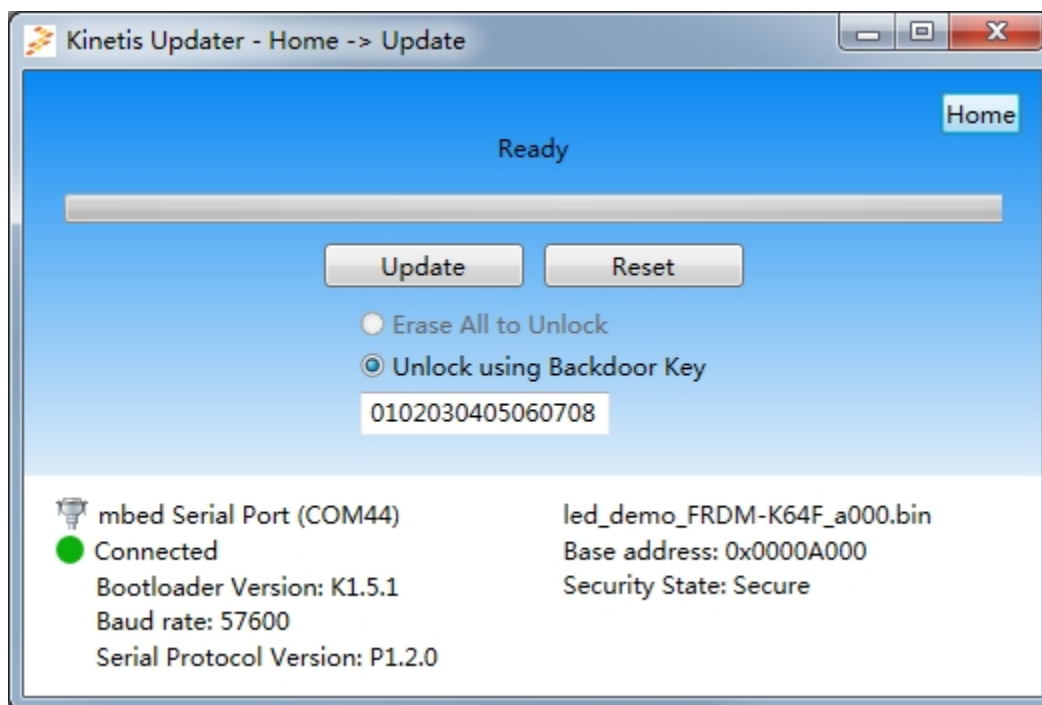


Figure 25. Ready to write image to device (Secure state)

#### 3.5.4.1 Erase All to unlock

Sends the flash-erase-all-unsecure command to the Kinetis bootloader before taking action to update progress. All of the device's non-volatile memory is erased, then sets the device into the unsecure state.

Kinetis bootloader may not support the mass erase command on some devices, so the radio button is set as uncheckable if the flash-erase-all-unsecure command is not supported.

#### NOTE

The flash-erase-all-unsecure command leaves the Kinetis device in an unsecure state until the user changes the secure state.

#### 3.5.4.2 Unlock using backdoor key

Sends the flash-security-disable command using the backdoor key in the textbox below before taking action to update progress. If the backdoor key matches the key stored in the device, the device is set into the unsecure state until reset.

#### NOTE

The flash-security-disable command can set device into the unsecure state until reset. At the last operation of update progress, the Kinetis Updater sends the reset command to set device back into the secure state.

### 3.5.4.3 Backdoor key textbox

Contains 16 hex digits used for unlocking the device. The textbox is visible only when the radio button “Unlock using backdoor key” is selected.

The key in the textbox must be 16 hex digits with no leading "0x". To avoid incorrect key inputs, the Kinetis Updater restricts the inputs from 0 to 9 and a(A) to f(F), and the user can only type up to 16 digits.

### 3.5.5 Home button

Click the "Home" button to navigate back to the home page.

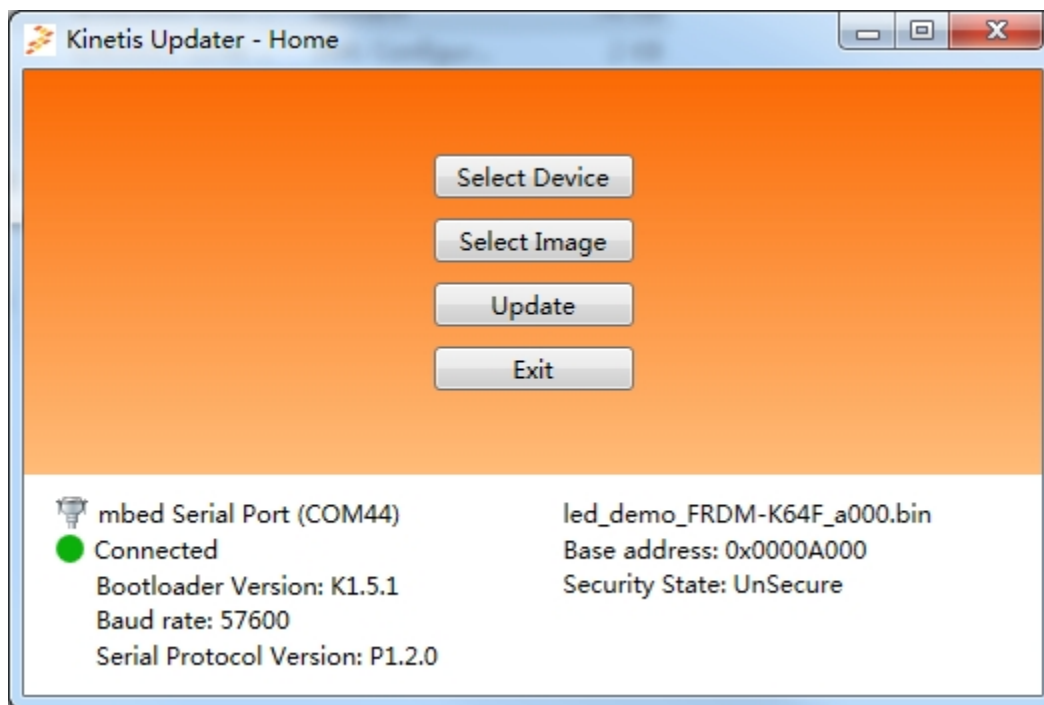


Figure 26. Home page after update process

## 4 Tips and tricks

### 4.1 Startup

Various parameters of the Kinetis Updater application are saved to a *user.config* file to preserve settings across executions. The saved parameters include:

- Window position
- Last device instance
- File history
- Last filename

- Base address
- Backdoor key

These parameters are saved during execution of the Kinetis Updater application. On subsequent launches, the saved parameters are retrieved and used as the current settings. This functionality is intended to save the user some steps, but may have unintended effects.

The settings are stored in the local app data folders:

“%LOCALAPPDATA%\Freescale\KinetisUpdater.exe\_”

Deleting the settings folders causes subsequent launches of the Kinetis Updater to run with default settings and no device or image file is selected.

## 4.2 Programming multiple devices

Sometimes, the user wants to update multiple devices using the same peripheral and image files.

After an update, the Kinetis Updater starts to reestablish the communication with the Kinetis bootloader. Once the new device arrives and the communication is established, the “Update” button is enabled, and user can do a second update without going back to previous page to reconnect the target. Refer to Section 3.5.3 for more information on the "Update" button functionality.

## 5 Revision history

This table summarizes revisions to this document.

**Table 2. Revision history**

Revision number	Date	Substantive changes
0	12/2014	Kinetis Bootloader 1.1.0 initial release
1	07/2015	Kinetis Bootloader 1.2.0 initial release

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