Airoha IoT SDK Flash Tool User's Guide

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Document Revision History

Revision	Date	Description
1.0	1st February 2016	Initial release.
1.1	30 June 2016	Refined the images and complement the information of using the flash tool.
1.2	13 September 2016	Fixed the library name and add the support Windows 10 platform
1.3	4 November 2016	Added the USB switch tool usage method.
1.4	5 May 2017	Changed name from MT2523 Flash Tool to IoT Flash Tool.

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1. Introduction

IoT Flash Tool is a flexible device flashing tool for application development on 2523/7686/7682/ HDK. It primarily supports downloading, formatting and reading back the binary from a target device. The Flash Tool provides high speed download. It supports the USB 2.0 high-speed serial bus.

This document guides you through the following.

- The download operation. It is used to download the software load to a target, see section 2.1, "Downloading the firmware".

- The format operation. It is used to erase the flash memory of the target, see section 2.2, "Formatting the flash".

- The readback operation. It is used to read the data from the target device's flash memory, see section 1, "Reading back the flash".

2. IoT Flash Tool

This section provides an installation guide for the IoT Flash Tool and covers the following items:

- The supported environment for installation.

- Installing the Flash Tool.

1.1. Environment

The IoT Flash Tool can be used on Microsoft Windows XP (Professional), Windows 7 (32 or 64 bit) and Windows 10 (32 or 64 bit) PC that support USB interface communication.

2523 HDK has a USB connector and the IoT Flash Tool operates through the USB. 7686 and 7682 HDKs provide USB to UART connector and the IoT Flash Tool operates through the UART.

Before using the IoT Flash Tool, install the corresponding driver, (section 1.3, "Installing the USB driver" and section 1.4, "Installing the UART driver".

1.2. Installing the IoT flash tool

To install the Flash Tool, simply copy the package folder to your Windows computer. No further steps are required.

There are three main components included in the Flash Tool package, `FlashTool.exe`, `DownloadLib.dll` and `Download Agent` (DA) file.

1.2.1. FlashTool.exe

This file launches the graphical user interface (GUI) program for The Flash Tool. The GUI requires a dynamic-link library (`DonwloadLib.dll`) to perform firmware update operations.

1.2.2. DownloadLib.dll

`DownloadLib.dll` is the kernel library for `FlashTool.exe`, to perform Boot ROM (BROM) and DA handshaking operations.

1.2.3. Download sgent

The IoT Flash Tool downloads the software binary named DA to target device's internal SRAM and executes it on the target. The DA handshakes with DownloadLib.dll to perform download, readback and format operations using a **USB** connecter or **UART**.

1.3. Installing the USB driver

To install the MTK USB Port driver for **USB** port on the 2523 HDK:

1) Install the MTK USB Port driver from MS_USB_ComPort_Driver folder located under the Flash Tool's release folder.

2) Connect the **USB** connector on the 2523 HDK to your computer's USB port with a USB cable.

To determine the COM port number corresponding to your device:

1) Open Windows **Control Panel** and click **System** then

    a) On Windows 7 and 8, click **Device Manager**.

    b) On Windows XP, click the **Hardware** tab and then **Device Manager**.

2) In **Device Manager**, navigate to **Ports (COM & LPT)** and locate **MTK USB Port** (**COMx**), as shown in Figure 1.

> Note: the driver version must be **1.1032.0** or later; an older driver doesn't guarantee successful download and operation.
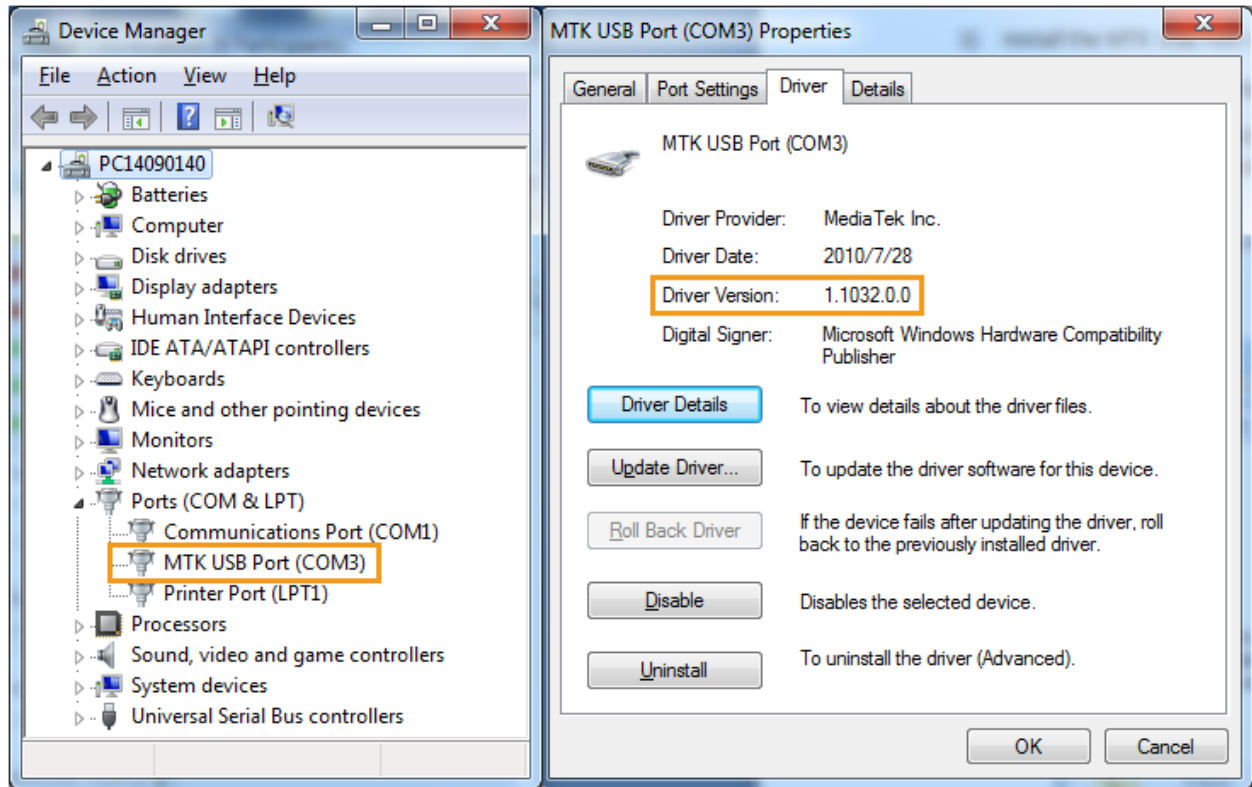
Figure 1. Installing the USB driver

1.4. Installing the UART driver

To install the MTK UART Port driver for **UART** port on 7686 and 7682 HDKs:

1) Install the UART Port driver from UART_Port_Driver folder located under the Flash Tool's release folder.

2) Connect the **USB to UART** connector on the 7686/7682 HDK to your computer's USB port with a USB cable.

To determine the COM port number corresponding to your device:

3) Open Windows **Control Panel** and click **System** then

    c) On Windows 7 and 8, click **Device Manager**.

    d) On Windows XP, click the **Hardware** tab and then **Device Manager**.

4) In **Device Manager**, navigate to **Ports (COM & LPT)** and locate **Mbed Virtual Serial Port** (**COMx**), as shown in Figure 2.

Figure 2. Installing the UART driver

2. Using the IoT Flash Tool

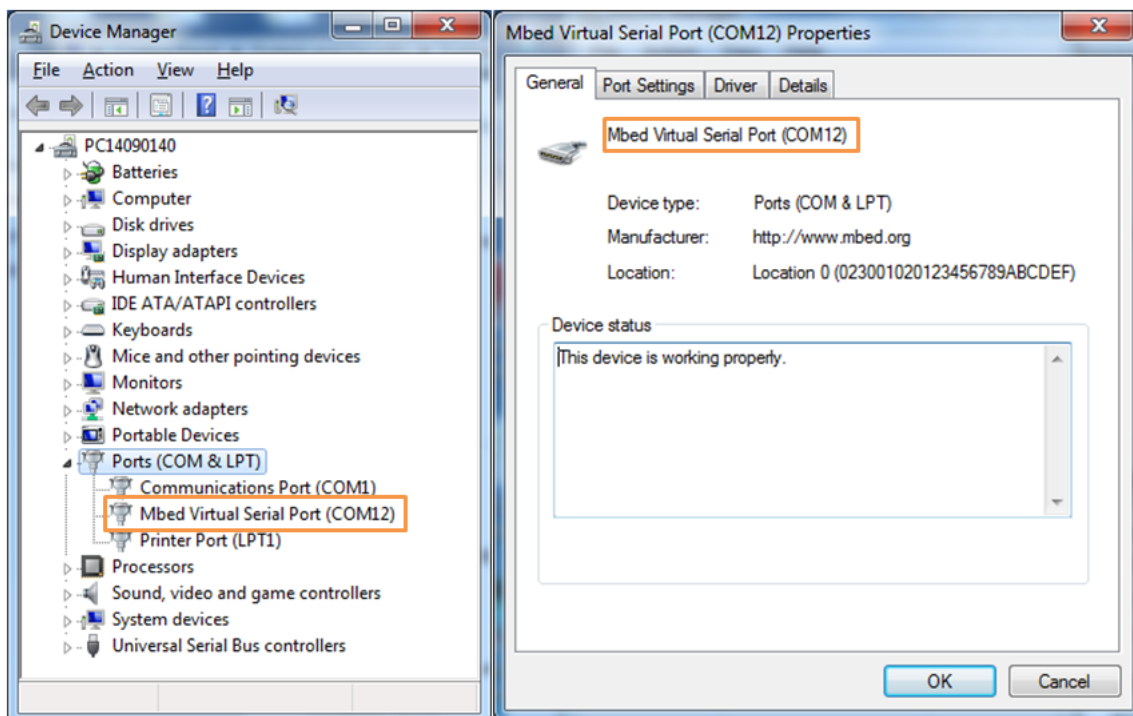The IoT Flash Tool is used to download, format and readback images on the flash memory of the target device. The main GUI of the tool is shown in Figure 3. Each item on the main GUI will be described in detail in the following sections.
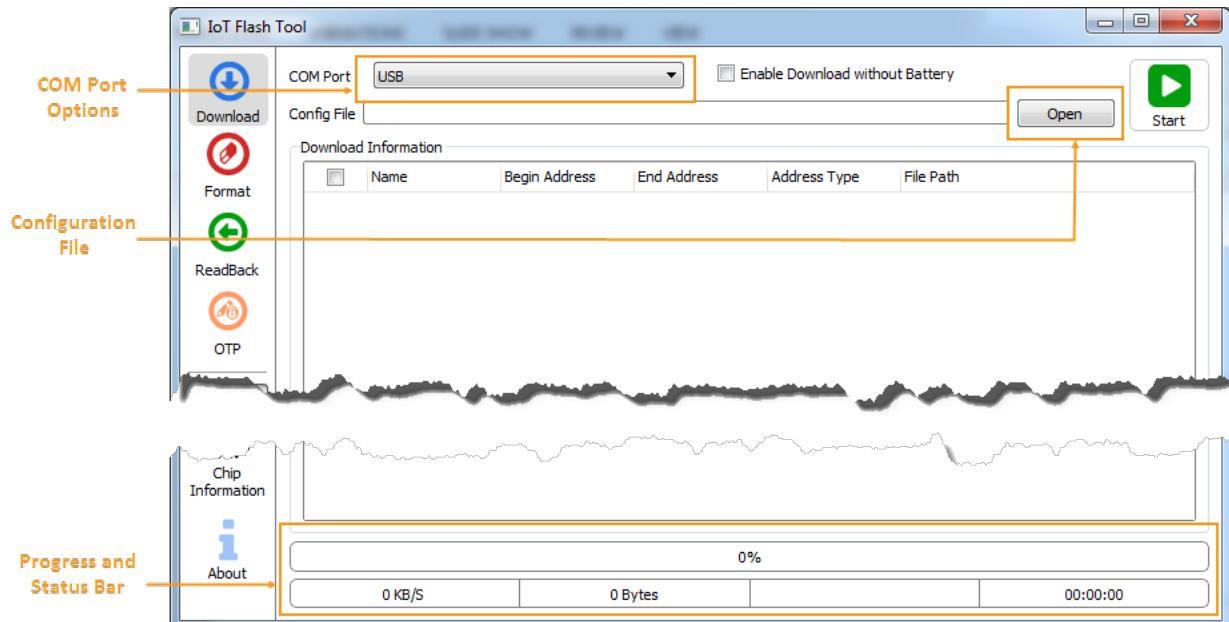

Figure 3. IoT Flash Tool's main GUI

2.1. Downloading the firmware

To download the firmware to the target device, use the **USB or UART** interface. If the download operation completes successfully, **Download Information** will be displayed, including **Name**, **Begin Address, End Address, Address Type** and **File Path** of the firmware binary, as shown in Figure 4.

2.1.1. Download the firmware with USB

To complete the download operation using USB (see Figure 4):

1) Power off the target (USB cable must be unplugged).

2) Click **Download** on the left panel of the main GUI.

3) Select **USB** from the **COM Port** drop down menu. If you don't have the adapter or battery, click the **Enable Download without Battery** option**.**

4) Click **Open** to provide the configuration file.

5) Click **Start** to start downloading.

6) Plug in the USB cable to power on the HDK through the **IoT USB** connector and then the process will start automatically.
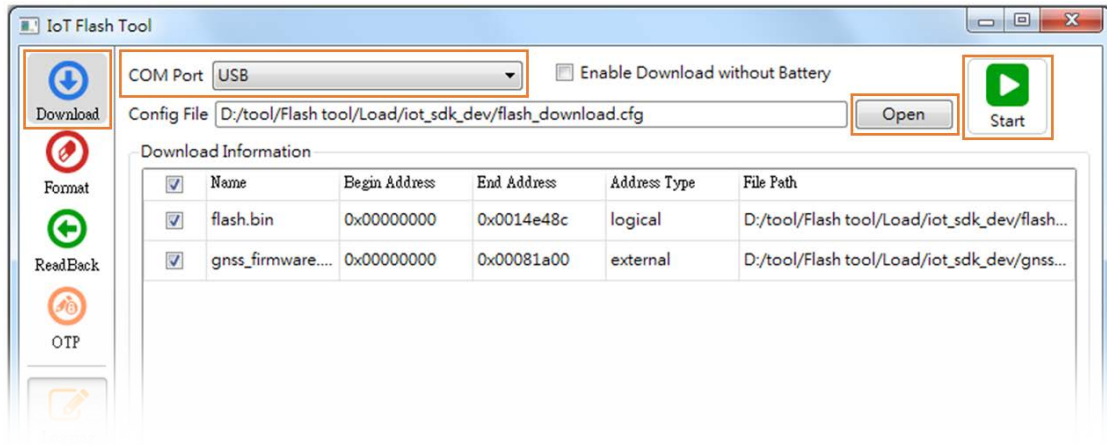
Figure 4. Download the firmware to a target device using USB connection

2.1.2. Download the firmware with UART

To complete the download operation using UART:

1) Plug in the **UART** cable.

2) Click **Download** on the left panel of the main GUI.

3) Select **UART** port from the **COM Port** drop down menu.

4) Click **Open** to provide the configuration file.

5) Click **Start** to start downloading.

6) Power on the HDK or press reset button on the HDK and then the process will start automatically.

Figure 5. Download the firmware to a target device using UART connection

2.2. Formatting the flash

Similar to download operation, the formatting also can be done through USB connection.

Open the format configuration window by clicking **Format** on the main GUI of the IoT Flash Tool, as shown in Figure 6. The **Format Information** section provides formatting options and enables setting the target module to format. The targets to format are specified under **Module Select** drop down menu, **Main**, such as IoT chipset and

GNSS, such as GNSS chipset. The GNSS formatting option is only available if the configuration file loaded on the target device contains decrypted binary software for the GNSS.

To automatically format the whole flash, select **Total Format** option. If **Manual Format** is selected, the Flash Tool will format the flash according to the user-defined settings. The settings contain the address type (**Logical** or **Physical**), **Begin Address** and **Length**. The logical address starts at 0x00000000. The physical address of the MT2523/MT7686/MT7682 starts at 0x08000000.

2.2.1. Format the flash with USB connection

To complete the format operation using USB connection (see Figure 6):

1) Power off the target (USB cable must be unplugged).

2) Click **Format** on the left panel of the main GUI.

3) Select **USB** from the **COM Port** drop down menu. If you don't have the adapter or battery, click the **Enable Download without Battery** option**.**

4) Click **Open** to provide the configuration file.

5) Select format method under **Format Information** section.

6) Click **Start** to start formatting.

7) Plug in the USB cable to power on the HDK through the **IoT USB** connector and then the process starts automatically.

Figure 6. Formatting the flash of a target device using USB connection

2.2.2. Format the flash with UART connection

To complete the format operation using UART connection

1) Plug in the **UART** cable.

2) Click **Format** on the left panel of the main GUI.

3) Select **UART** port from the **COM Port** drop down menu.

4) Click **Open** to provide the configuration file.

5) Select format method under **Format Information** section.

6) Click **Start** to start formatting.

7) Power on the HDK or press reset button on the HDK and then the process starts automatically.

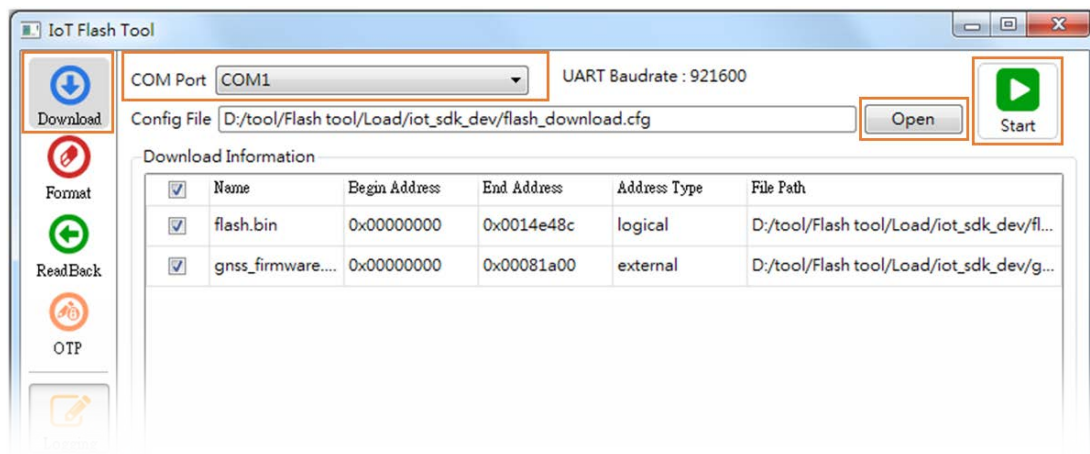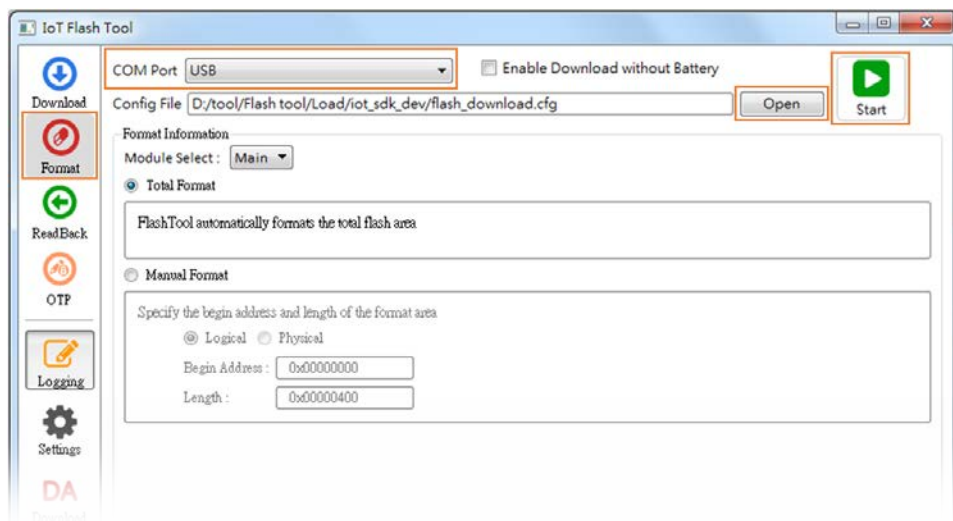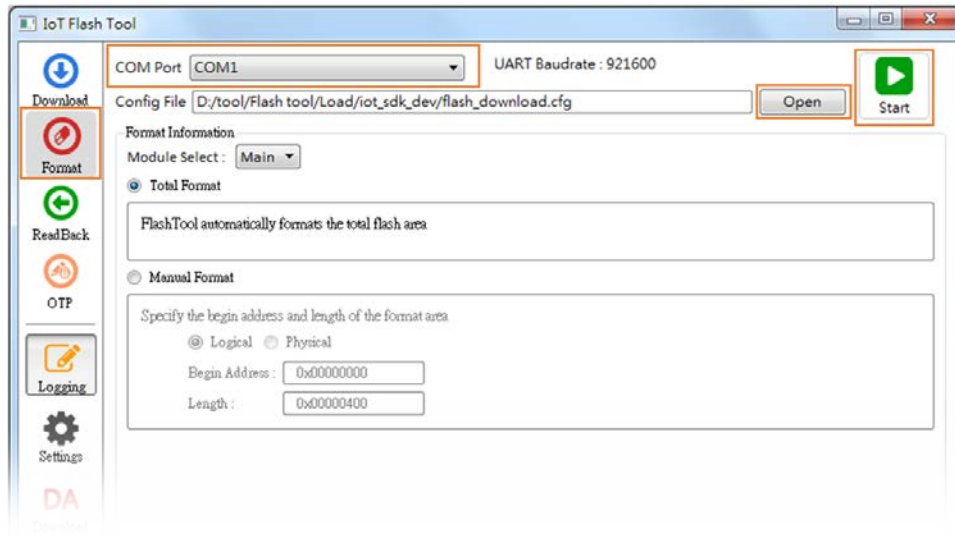*Figure 7. Formatting the flash of a target device using UART connection*

1.2. Reading back the flash

To read back the flash, click **ReadBack** on the main GUI to open the configuration settings. The **ReadBack Information** section enables adding or removing flash memory blocks according to the readback file on a specified target. See section 2.2, "Formatting the flash", for more information about **Module Select.**

1.2.2. Adding and removing readback files

To add a readback file:

Click **Add** to add a readback file, as shown in Figure 8.

Figure 8. Adding a readback file

Click **SAVE** to provide the **File Path** of the readback file, as shown in Figure 9.
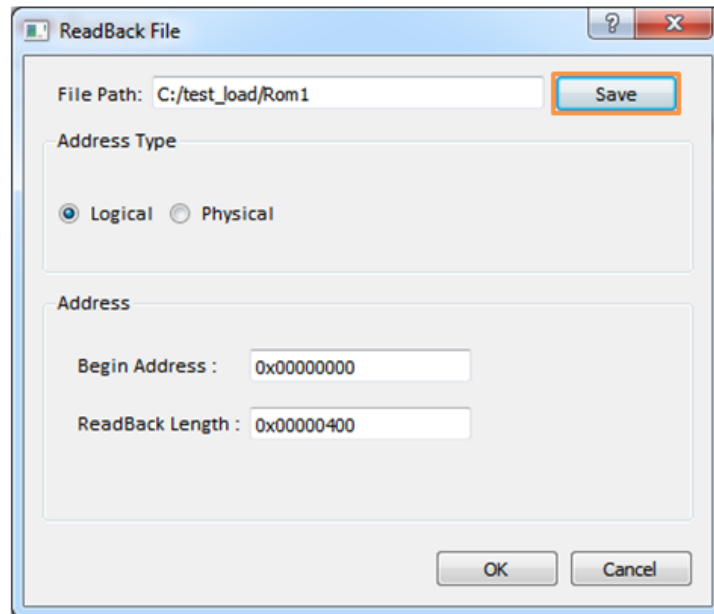

Figure 9. Opening the readback file

Choose the **Address Type** of the flash either **Physical** or **Logical**, see section 2.2, "Formatting the flash", for more details about the address type.

Provide **Begin Address** and **ReadBack Length** in their corresponding fields under **Address** section (see Figure 9).

To delete an existing readback file, highlight the file and click **Remove**, as shown in Figure 10.

Figure 10. Deleting an existing readback file

1.2.3. Readback a file with USB connection

To complete the readback operation using USB (see Figure 11):

1) Power off the target (USB cable must be unplugged).

2) Click **ReadBack** for further configuration.

3) Select **USB** from the **COM Port** drop down menu. If you don't have the adapter or battery, click the **Enable Download without Battery** option**.**

4) Click **Open** to provide the configuration file to enable the **Module Select**.

5) Click **Add** to assign a readback file with a specified memory range, see section 1.2.2, "Adding and removing readback files" for more details about the add function.

6) Click **Start** to start the readback operation.

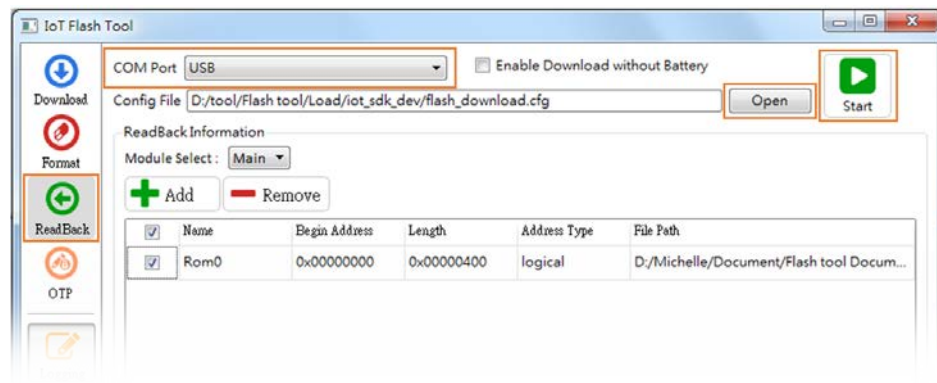7) Plug in the USB cable to power on the HDK through the USB connector and then the process starts automatically.

Figure 11. Reading back a file using USB

1.2.4. Readback a file with UART connection

To complete the readback operation using UART:

1) Plug in the **UART** cable.

2) Click **ReadBack** for further configuration.

3) Select **UART** port from the **COM Port** drop down menu

4) Click **Open** to provide the configuration file to enable the **Module Select**.

5) Click **Add** to assign a readback file with a specified memory range, see section 1.2.2, "Adding and removing readback files" for more details about the add function.

6) Click **Start** to start the readback operation.

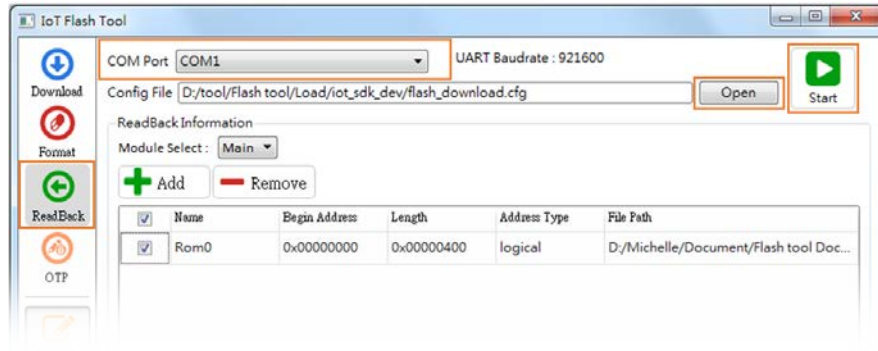7) Power on the HDK or press reset button on the HDK and then the process starts automatically.

Figure 12. Reading back a file using UART

1.3. One-time programmable memory

One-time programmable (OTP) memory cannot be changed once the application is loaded into the device. The OTP enables to read/write operations with to/from a file with a specific begin address and length. It also enables to lock the OTP area.

To read the OTP flash to a file:

1) Select **Read** option under **OTP Information** to configure the settings for **Begin Address** and **Length** of the read area.

2) Click **Save** to provide the file path to store the settings.

To write a particular OTP flash to a file:

Select **Write Only**, if **Write and Lock** is selected, you are allowed to write the particular OTP flash which won't be written anymore to a file.

If you select **Lock Only**, the particular OTP flash will be read-only.

1.3.2. One time program a file with USB connection

To complete the OTP flashing operation using USB connection (see Figure 13):

1) Power off the target (USB cable must be unplugged).

2) Click **OTP** on the left panel of the main GUI.

3) Select **USB** from the **COM Port** drop down menu. If you don't have the adapter or battery, click the **Enable Download without Battery** option.

4) Click **Open** to provide the configuration file.

5) Select OTP method under **OTP Information** section.

6) Click **Start** to start formatting.

7) Plug-in the USB cable to power on the HDK through the **IoT USB** connector and then the process starts automatically.
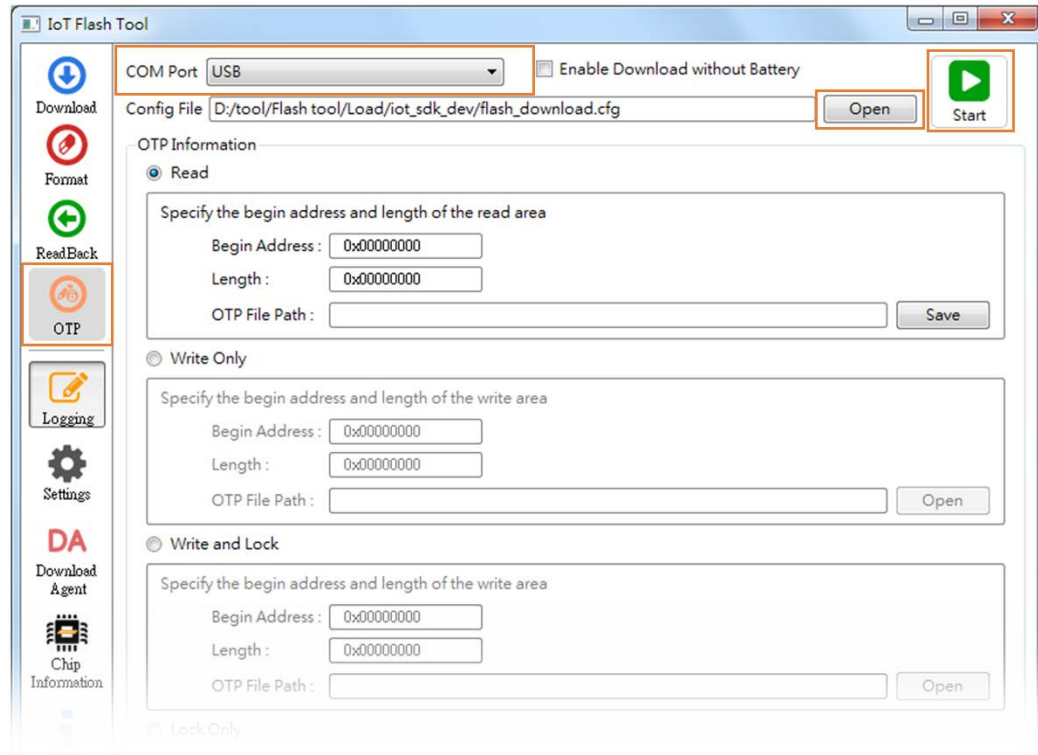
Figure 13. OTP configuration with USB connection

1.3.3. One time program a file with UART connection

To complete the OTP flashing operation using UART connection:

1) Plug in the **UART** cable.

2) Click **OTP** on the left panel of the main GUI.

3) Select **UART** port from the **COM Port** drop down menu.

4) Click **Open** to provide the configuration file.

5) Select OTP method under **OTP Information** section.

6) Click **Start** to start formatting.

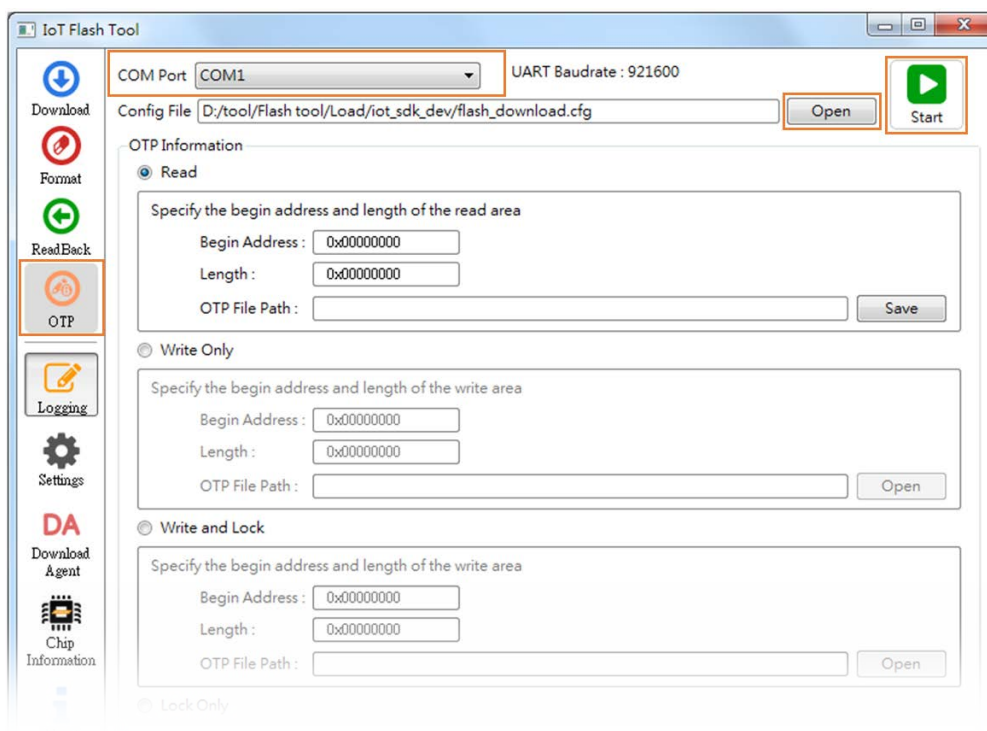7) Power on the HDK or press reset button on the HDK and then the process starts automatically.

Figure 14. OTP configuration with UART connection

1.4. Logging

Logging is a convenient operation to enable debugging and storing log files for further processing. Click **Logging,** as shown in Figure 15, to automatically save the debug message to the location provided in the **Settings**.
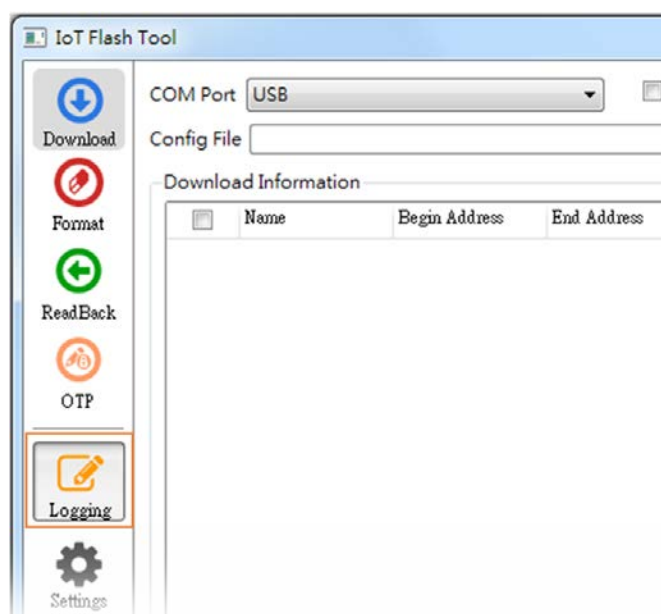

Figure 15. Logging a debugging message into a file

1.5. Settings

The setting option enables configuring the logging and USB interface settings. Click **Settings** on the main GUI of the Flash Tool (see Figure 3) to change the debug log file path under **Logging** setting, as shown in Figure 16.
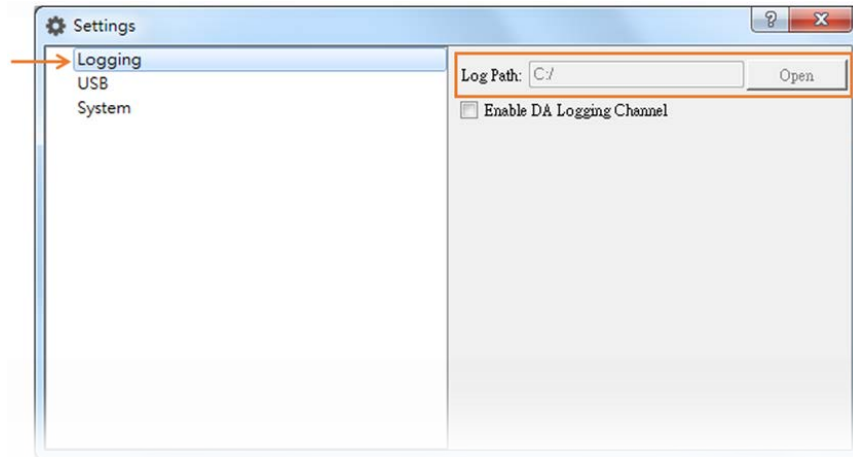

Figure 16. Configure the Logging settings

You can also enable or disable the USB 2.0 connectivity support under USB setting, as shown in Figure 17. This option changes the USB 1.1 full speed support to USB 2.0 high speed.
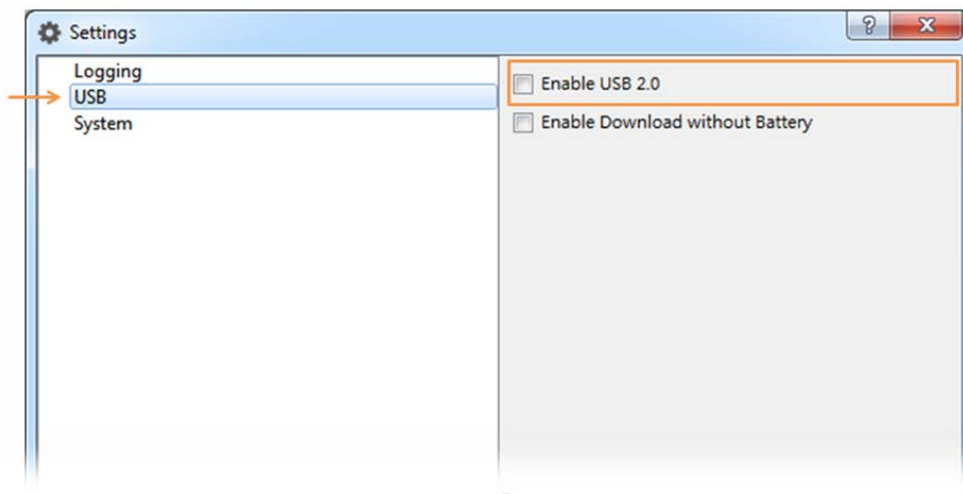

Figure 17. Enabling the high speed USB connectivity support

Enable or disable the download without battery support is also available under **USB** setting, as shown in Figure 18. This option changes the charging method of the target. If the option is enabled, the target is powered on through a USB cable.
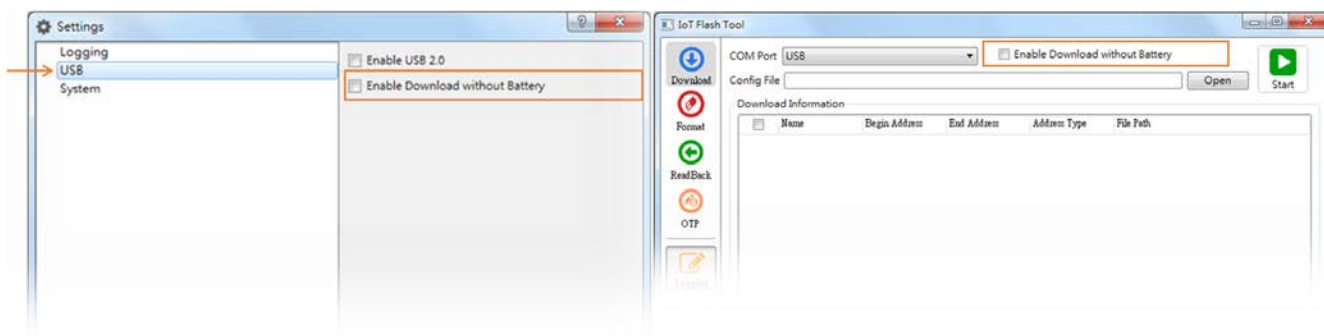
Figure 18. Enabling the download without battery support

Check **Disable the Long-Press Power Key**, as shown in Figure 19, to disable the **PWR key** function on the HDK during the Flash Tool operations of download, format and readback. This option is not applicable if the Flash Tool is not in use.
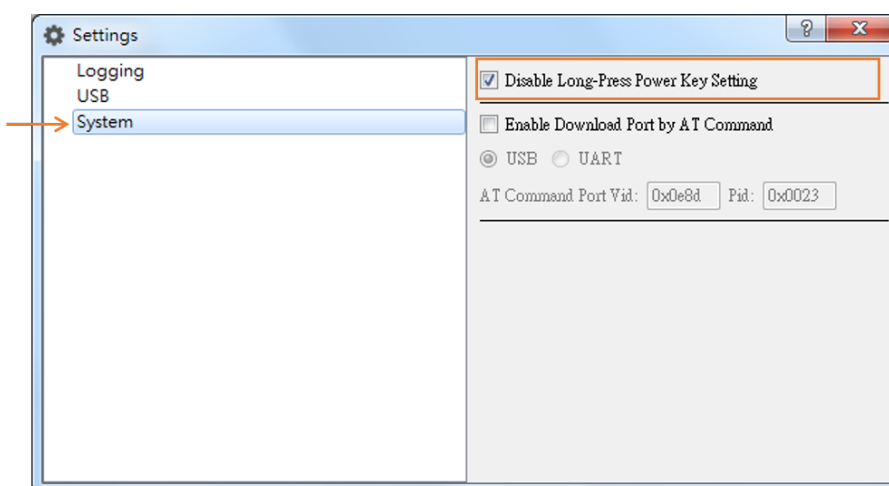

Figure 19. Disable the long press power key setting

Check **Enable USB Switch Tool**, as shown in Figure 20, to enable USB switch tool on the HDK during the Flash Tool operations of download, format and readback. This option is used to enable download port by AT command after target have already boot-up. This option has to be used with software load released after SDK version 4.1.0.
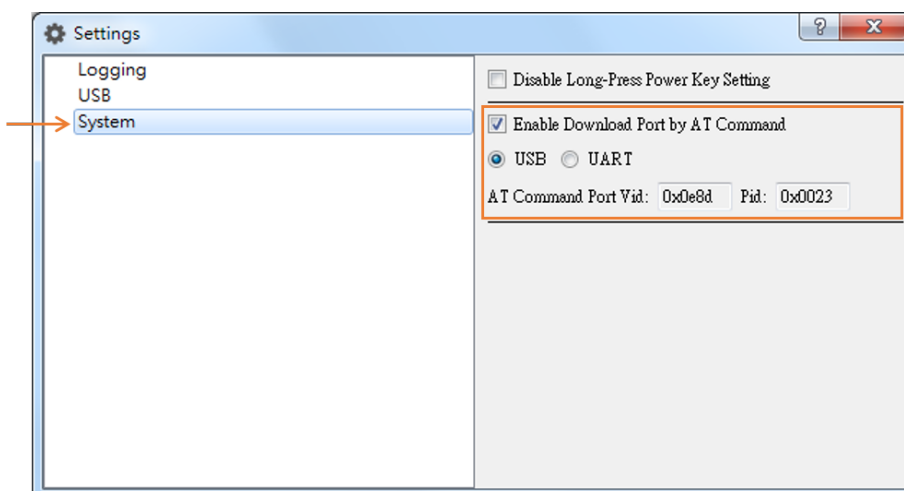

Figure 20. Enable USB Switch Tool Setting

1.6. Download Agent

A dialog window will open once you click **DA Download Agent** on the main GUI of the Flash Tool (see Figure 3). Click **Open** to change the file path to your DA file, as shown in Figure 21. The **Version** and **Build-Date** of the selected download agent will be immediately displayed. For more details on DA see section 1.2.3, "Download sgent".
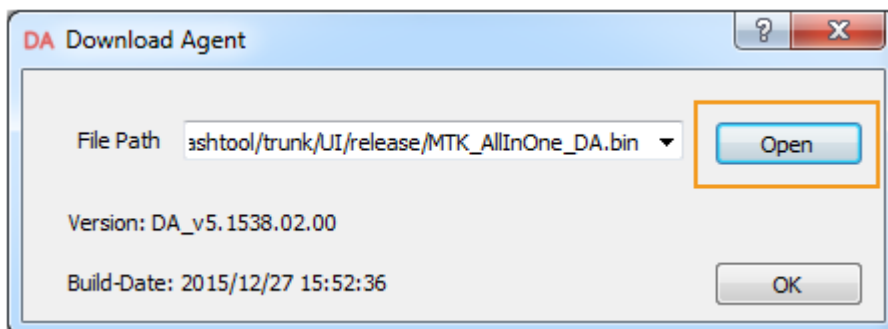

Figure 21. Configuration dialog for the DA

1.7. Chip Information

Click **Chip Information** on the main GUI of the Flash Tool (see Figure 3) to find out more about the target chipset including details on the **Chip ID**, **PSRAM** and **Serial Flash**, as shown in Figure 22.
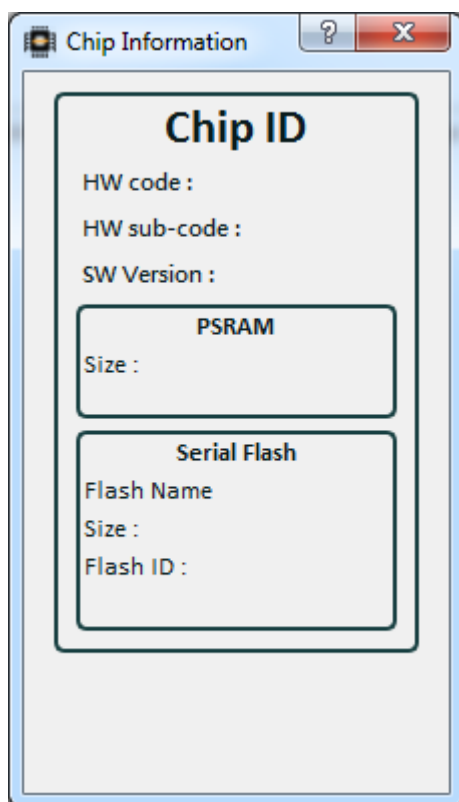

Figure 22. Chip information of a target device

1.8. About

Click **About** on the main GUI of the Flash Tool (see Figure 3) to find more details about the Flash Tool.

1.9. Progress and status bar

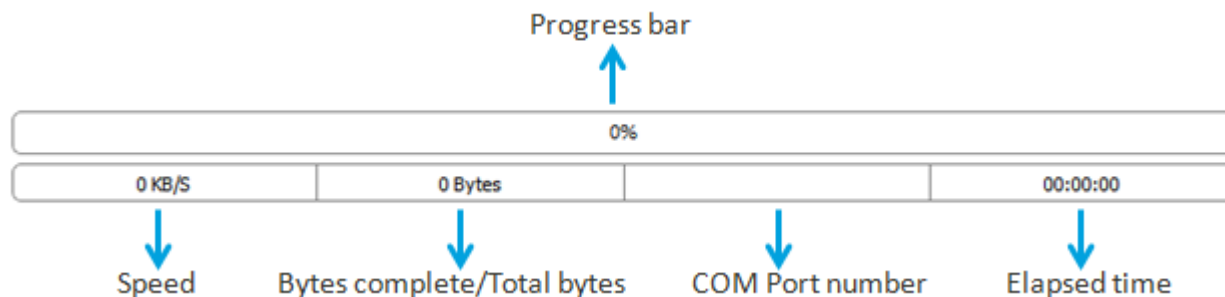The progress bar displays the progress of download, format and readback operations, as shown in Figure 23.

Figure 23. Progress bar and status details