

AT32F403A/407 MSC IAP SpiFlash As Disk

Introduction

This sample code provides USB external SPI Flash virtual disk, which is upgraded through the disk storage firmware.

Note: The corresponding code in this application note is developed on the basis of V2.x.x BSP provided by Artery. For other versions of BSP, please pay attention to the differences in usage.

Applicable products:

| | |
|-------------|-------------|
| Part number | AT32F403Axx |
| | AT32F407xx |

List of peripherals:

| | |
|------------------|------------|
| Main peripherals | USB_device |
| | SPI3 |

1 Design overview

PC copies the device firmware to U disk through the external SPI Flash virtual disk. Once the IAP program starts, it checks firmware for upgrade. If needed, it reads the firmware through FATFS (FAT format only) for upgrading.

It supports .bin file upgrade only.

1.1 Peripherals

The SPI peripheral of this sample code is SPI3 (SCK:PB3, MISO:PB4, MOSI: PB5, CS:PA15), which can be modified by users as needed.

The external SPI FLASH is W25Q128FV. For different SPI FLASH, users can modify configurations (including FLASH commands, flash size, sector size, etc.) according to the specific model and size.

1.2 Address range

IAP address range: 0x08000000~0x08008000, 32 K in total

APP address range: 0x08008000~

1.3 Upgraded bin file name

The upgraded .bin file is named as “app.bin”.

The firmware name cannot exceed 11 bytes (to save the space used by IAP).

1.4 Upgrade status

After successful upgrading, the “app.bin” is renamed as “success.bin”;

If upgrade fails, the app.bin is renamed as “error.bin”.

1.5 Upgrading process

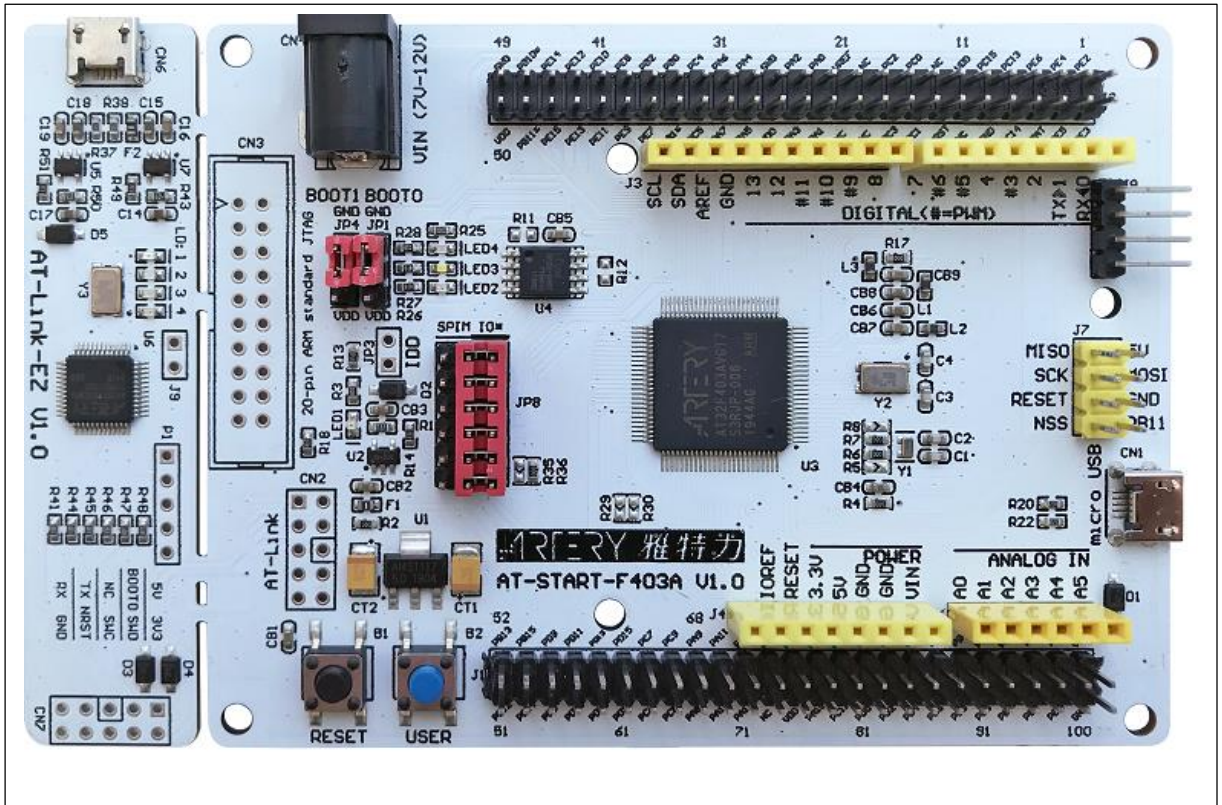
1. Enter IAP
If IAP does not perform upgrade before, enter IAP directly; otherwise, it is necessary to upgrade again (press the USER key on AT-START evaluation board and perform device reset).
2. Connect USB to PC, and find the corresponding disk;
3. Copy the new firmware app.bin to the disk;
4. Reset the device after the copy is finished;
5. IAP performs firmware upgrade after device reset;
6. After completion of IAP upgrading, check whether the upgrade is successful by the following methods:
Method 1: If LED4 is ON, it indicates successful upgrade; if LED3 is ON, it indicates that upgrade fails.
Method 2: After the completion of upgrading, if the file is named as “success.bin”, it indicates successful upgrade; if the file is named as “error.bin”, it indicates that upgrade fails (it should be noted that the former .bin file status is deleted after completion of upgrading, by default; then, the current app.bin is changed to the corresponding upgrading status).
7. If the upgrade succeeds, reset device to jump to execute app.

2 Application method

2.1 Hardware requirements

- 1) AT-START-F403A V1.0 evaluation board (or the corresponding evaluation board of other series)

Figure 1. AT-START-F403A V1.0 evaluation board



2.2 Software requirements

- 1) SourceCode
 - MSC_IAP_SpiFlash_As_Disk

Note: All projects are built around keil 5. If users want to use them in other compiling environments, please refer to BSP_V2.x.x\project\xxx\templates (such as IAR6/7/8, keil 4/5) for a simple change.

2.3 Example of application

- 1) Open the MSC_IAP_SpiFlash_As_Disk project and download to the evaluation board (press the USER key and reset); then, connect the on-board USB interface to PC, and the PC device manager will display a U disk device. Format this disk and copy firmware to the U disk, and reset the device after the copy is finished. Then, IAP checks firmware for upgrade; if needed, it will perform firmware upgrade.

Note: The external SPI FLASH used in this demo is WINBOND W25Q128FV, based on which the commands supported by code are compiled. If other external storage memories are used, it is necessary to modify the underlying driver.

3 Revision history

Table 1. Document revision history

| Date | Version | Revision note |
|------------|---------|------------------|
| 2022.07.28 | 2.0.0 | Initial release. |

IMPORTANT NOTICE – PLEASE READ CAREFULLY

Purchasers are solely responsible for the selection and use of ARTERY's products and services, and ARTERY assumes no liability whatsoever relating to the choice, selection or use of the ARTERY products and services described herein.

No license, express or implied, to any intellectual property rights is granted under this document. If any part of this document deals with any third party products or services, it shall not be deemed a license grant by ARTERY for the use of such third party products or services, or any intellectual property contained therein, or considered as a warranty regarding the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

Unless otherwise specified in ARTERY's terms and conditions of sale, ARTERY provides no warranties, express or implied, regarding the use and/or sale of ARTERY products, including but not limited to any implied warranties of merchantability, fitness for a particular purpose (and their equivalents under the laws of any jurisdiction), or infringement of any patent, copyright or other intellectual property right.

Purchasers hereby agrees that ARTERY's products are not designed or authorized for use in: (A) any application with special requirements of safety such as life support and active implantable device, or system with functional safety requirements; (B) any air craft application; (C) any automotive application or environment; (D) any space application or environment, and/or (E) any weapon application. Purchasers' unauthorized use of them in the aforementioned applications, even if with a written notice, is solely at purchasers' risk, and is solely responsible for meeting all legal and regulatory requirement in such use.

Resale of ARTERY products with provisions different from the statements and/or technical features stated in this document shall immediately void any warranty grant by ARTERY for ARTERY products or services described herein and shall not create or expand in any manner whatsoever, any liability of ARTERY.