

FMD-LINKUser Manual

[Version 0.1]

2020/04/28

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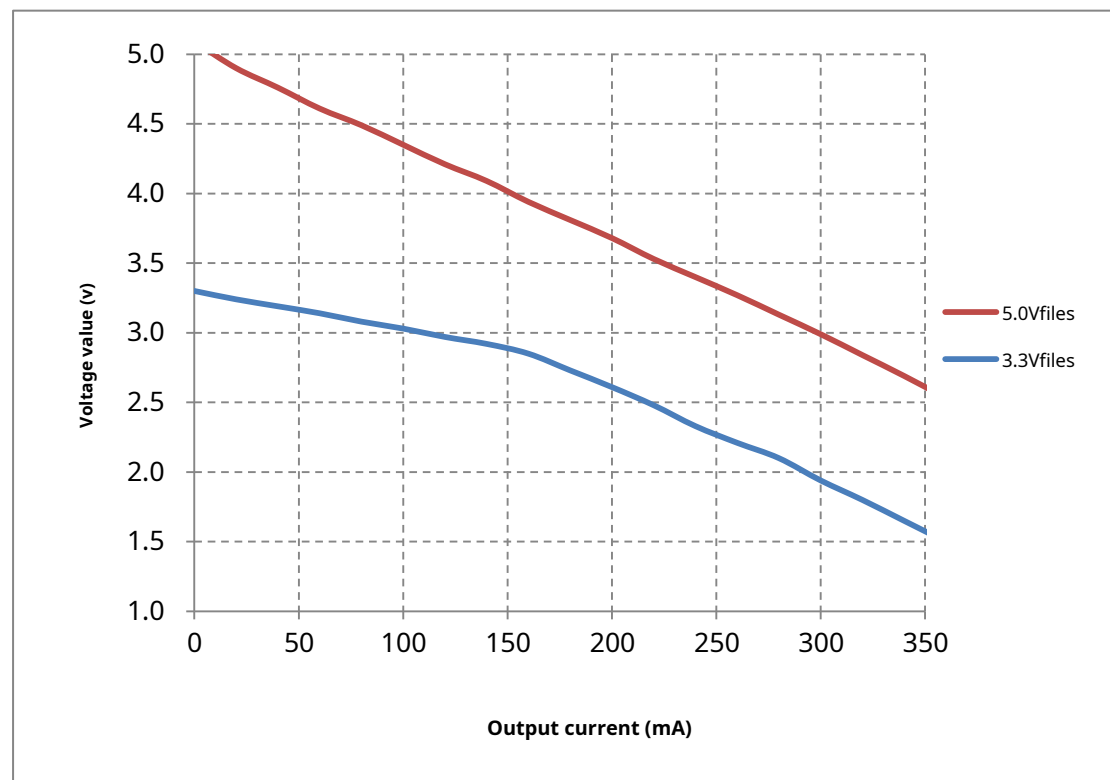
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1 Instructions before use

1.1 Parameter Description

1) Operating Voltage: 5.0~5.5V;

2) output current (supply current $\geq 500\text{mA}$): Power supply voltage of the burner port (5.0V file and 3.3V gear) and the output current are as follows:



3) When the board is downloaded or burned, VDD and GND Maximum capacitance between: $470\mu\text{F}$;

4) External programming cable length: recommended $\leq 50\text{cm}$;

1.2 Hardware Description

FMD LinkFull range for Huimang Microelectronics Co., Ltd.8bit MCUonline simulation, touchICofTouch KeyDebugging, offline/online programming, etc.



Hardware Description:

1) MINI USBInterface: used to connect to the computer and power supply;

2) Burning key: offline burning trigger key;

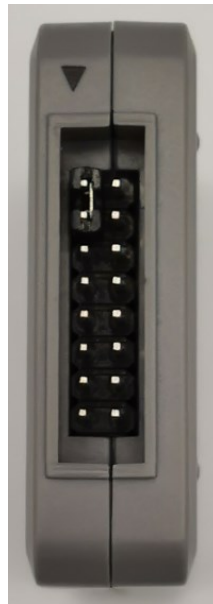
3) Status Indicator:

Power-on status: the red light is on at the initial power-on, and the green light is on when the software is connected to the computer;

Burning status:

- The green light is on when the download or burning is successful;
- The red light is on when downloading or burning fails;
- When it is used as a programmer, if the rolling code/number of programming is abnormal, the red light flashes for a long time.FMDWriterThe interface reloads the burning file and related configuration information;

4)Cable interface:



The order of the cable interfaces (starting at the arrow on the side of the housing) is:



3.3V: andVMCUshort circuit, thenICThe voltage is3.3V	3.3V: Pick-up deskVDDInput port, only selectable3.3V!
VMCU: TargetICSupply voltage, with jumper cap short-circuit selection	EXVDD: andVMCUshort circuit, thenICvoltage for external power
5.0V: andVMCUshort circuit, thenICThe voltage is5.0V	EXVDD: connected to external powerVDD
VDD: TargetICpower supply, connectICofVDDfoot	NG: programming failure signal, active low
GND: TargetICland, connectICofGNDfoot	OK: programming success signal, active low
CLK: TargetICclock input, connectICofISPCLKfoot	BUSY: During programming, active low
DAT: TargetICdata port, connectICofISPDATfoot	START: Start programming signal, active low
FOSC: TargetICThe test/calibration frequency port, connectICofCLKOfoot	GND: connected to external powerGND,Or connect to burnerVSS

- Part in red font: targetICProgramming simulation voltage selection, with jumper cap short-circuit selection;
- Part in blue font: burning emulation port, among whichFOSCmouth asFMDWriterThe frequency measurement/calibration pin when programming is used is an optional function;
- Black font part: machine burning interface;

Notes are as follows:

- FMD Linkin factory packagingUSBline passesFMDCertification, if using non-packageUSBline, will not guaranteeFMD Linknormal use;

1.3 Software Compatibility Notes

FMD Link can be connected at the same time. PCTerminal software: development simulation software FMDIDE, touch debugging software TouchTool, Burn mass production software FMDWriter.

Notes are as follows:

- Touch debugging software TouchTool: If debugging is in progress, such as the process of testing no touch value/touch value or effect verification, this is the highest priority. At this time, there is no response to clicking the operation of other software interfaces or the offline programming button, and you need to stop touching. After debugging, the operation of other software will be executed;
- Development of simulation software FMDIDE: If you are downloading or debugging the simulation, it is not recommended to perform other software operations or press the offline burning button, which may cause IDE download or debugging failed;
- Burn mass production software FMDWriter: gotta be FMDWriter. After the interface loads the burning file and related parameter settings, you can use the burning button to burn, that is, the content of offline burning is FMDWriter. The interface loaded shall prevail, it has nothing to do with other software!
- three software FMDIDE, TouchTool and FMDWriter. The interface can be opened at the same time, but it is not recommended that when one of the software is performing download, burning/debugging and other operations, newly opening the other two software may cause the operation in progress to fail. Therefore, if necessary, it is recommended to perform no operation. open other software;

2 Simulation Instructions

2.1 Emulator software

FMDIDE It is Huimang Microelectronics Co., Ltd. FMD All series 8bit MCU. The development software provided by the user has the main functions of editing, compiling, downloading, debugging, and simulation operations.

2.1.1 Software Installation

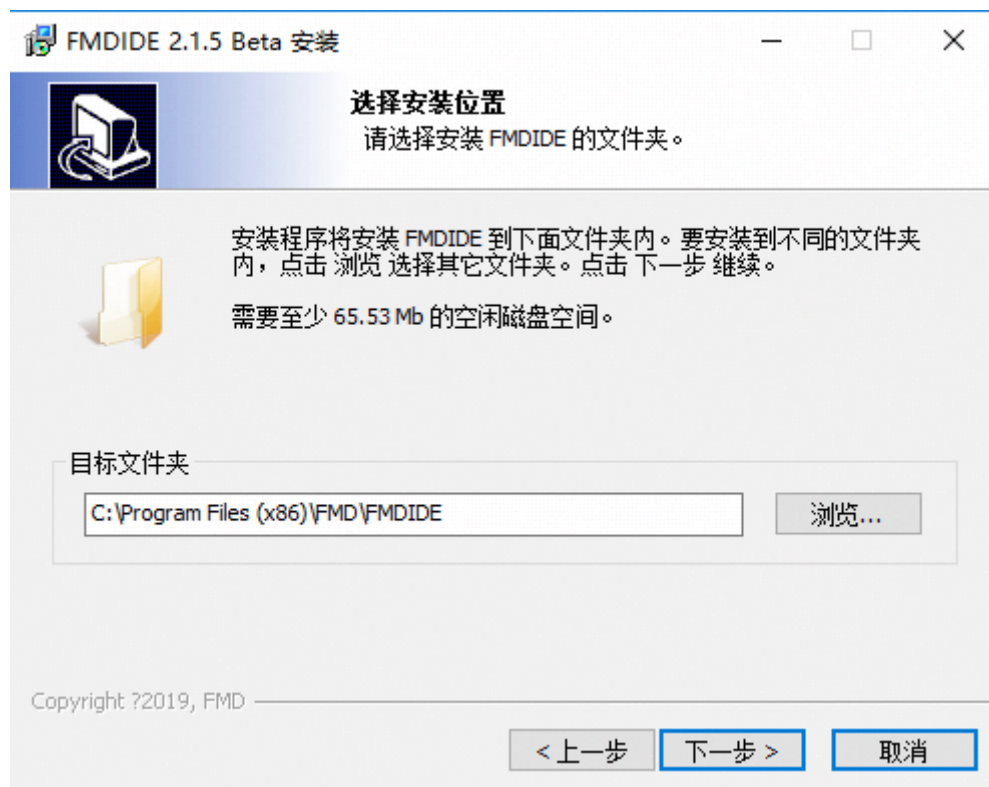
Please go to the official website www.fremontmicro.com Download the latest version of the emulator software and install it as follows (start with V2.1.5 version as an example):

Note: in Windows 7 and Windows 10 Administrator privileges are required to install and run on the system.

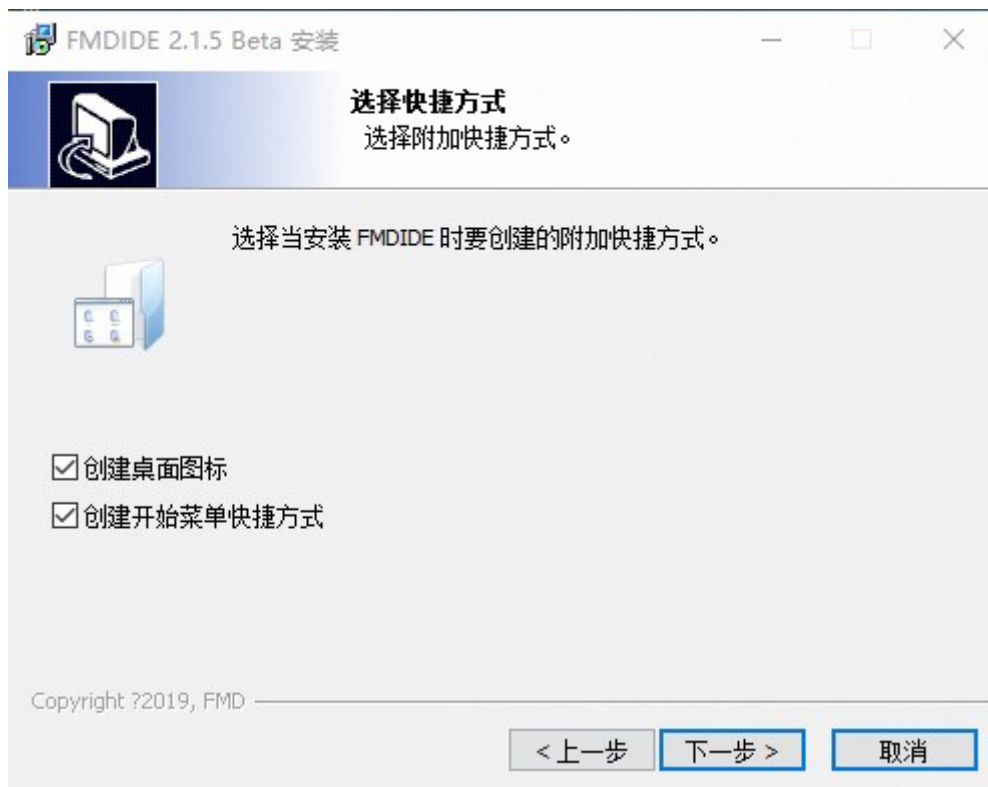
- ① double click Setup.exe, start installation FMDIDE software;



- ② Click "Next", select the installation location, the default installation path is "C:\Program Files (x86)\FMD\FMDIDE";



- ③ Click "Next" and select additional shortcuts as required;



- ④ Continue to click "Next" to prepare for installation. After confirming that the installation settings are correct, click "Install";

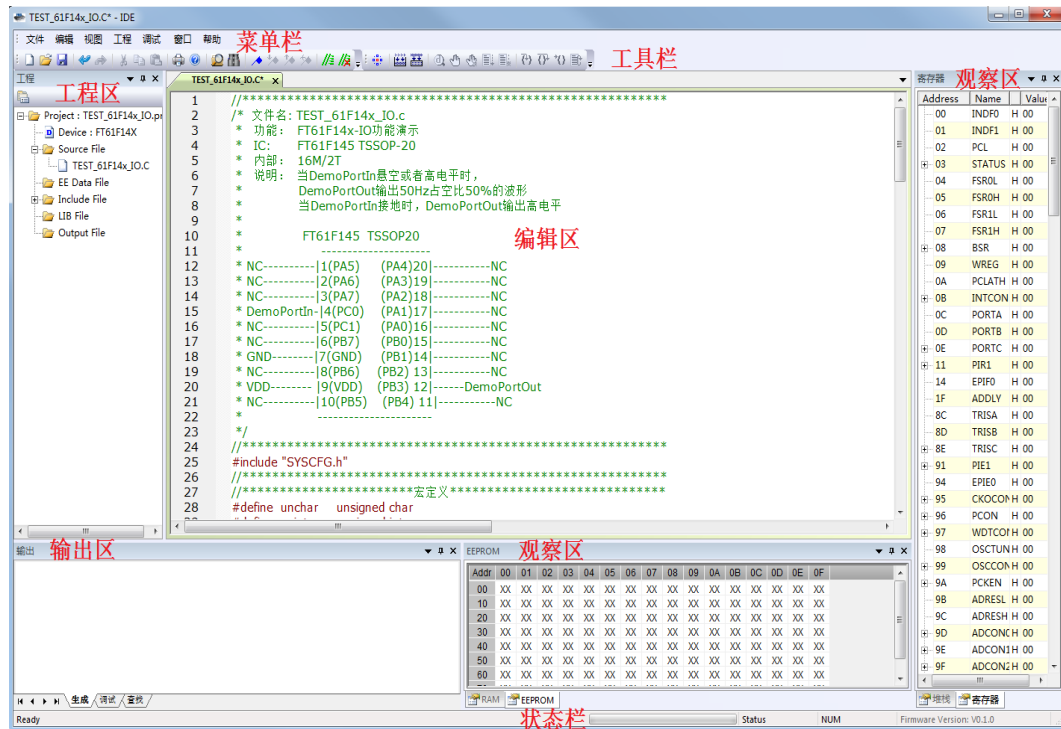


- ⑤ After the installation is complete, check whether to open automatically as needed FMDIDE Software and version update readme, click "Finish" to end the installation wizard;



2.1.2 Software interface description

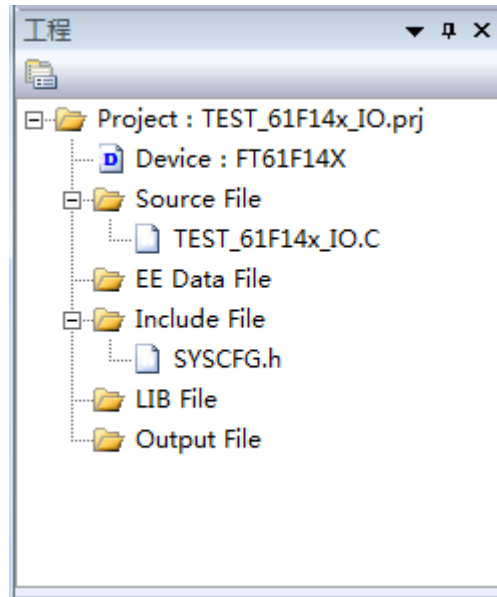
FMDIDE The default user interface of the software is shown in the figure2-1, including the menu bar, toolbar, project area, editing area, output area, viewing area and status bar. Except for the editing area, other areas are tool windows that can be dragged, hovered and docked. Users can customize the window layout according to their habits, or click the window in the menu bar to reset the window layout to restore the default interface.



picture2-1Main interface

After opening the project file, the description of each tool window is as follows:

- Menu bar: including "File", "Edit", "view", "project", "Debug", "Windows", and "Help".
- Toolbar: Provides users with quick access to frequently used commands in the form of icon buttons, including "File", "edit" and most commands under the Debug menu. Lighted icons indicate actions that are currently available, and dimmed icons indicate actions that are currently unavailable. Hover the mouse over an icon to see the corresponding operation and description of the icon.
- Project area: Display project information, as shown in the figure2-2shown, including project name, device name, source file, data file, header file, reference file and output file. Double-click the file name to open and view the file.



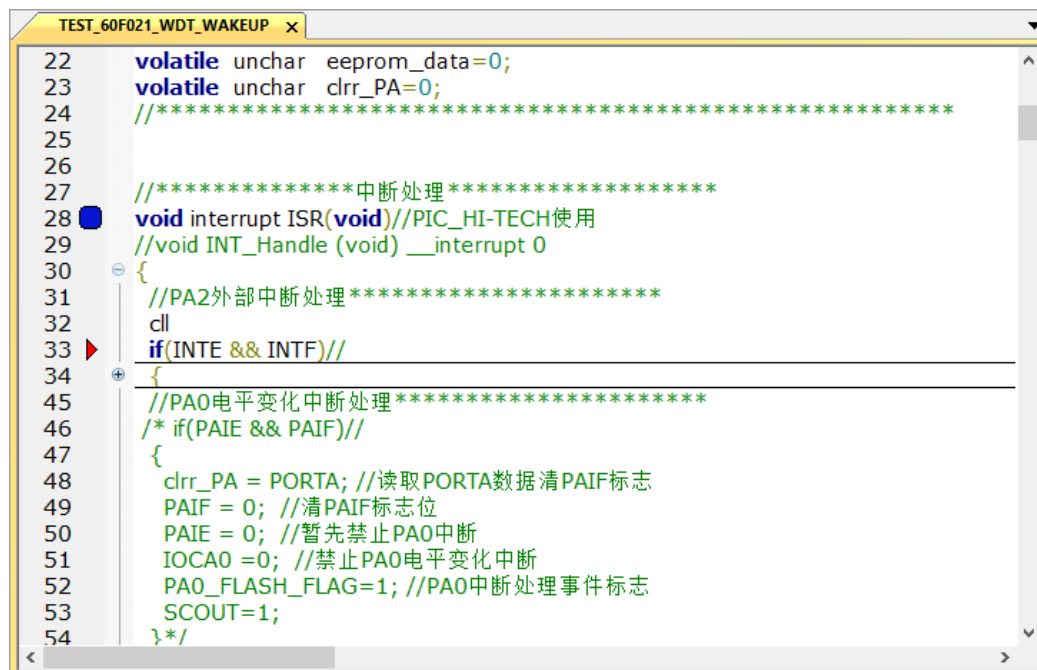
picture2-2Engineering area

- Editing area: used to edit source files and reference files, enter the Enter key to automatically indent.

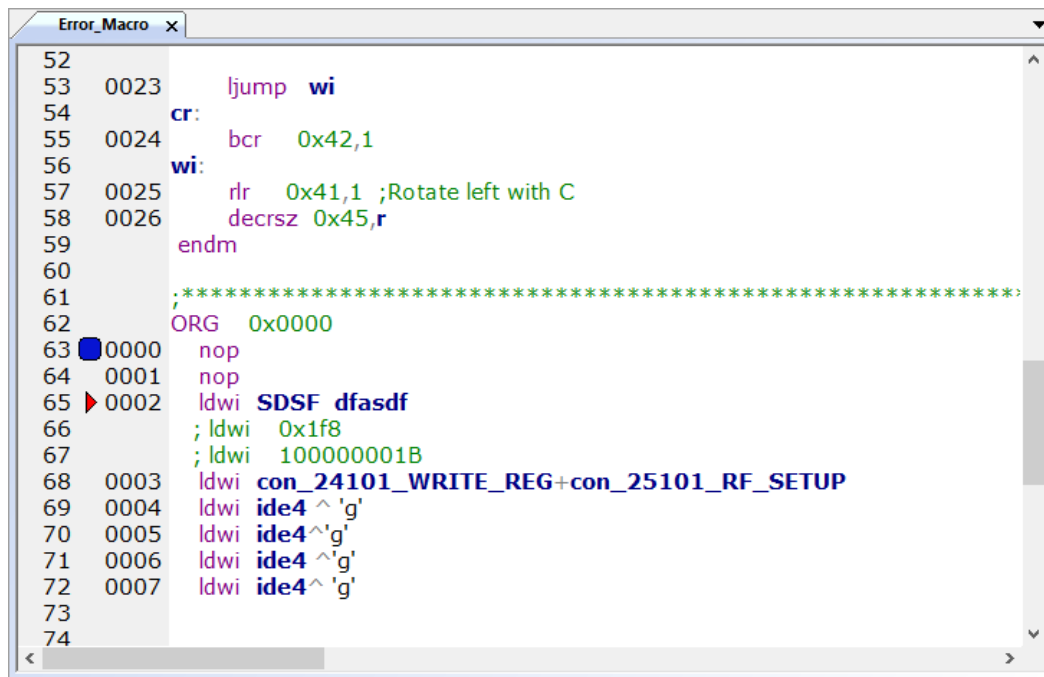
The left side of the editing area is divided into three columns:

existCIn the file: the first column shows the line number, the second column shows the mark, and the third column shows the expansion "+" sign, as shown in the figure2-3 shown.

existASMin the file: the first column shows the line number, the second column shows the mark, the third column showsPCValue (displayed after successful compilation) , as shown in the figure2-4shown.



picture2-3 Cfile editing area



picture2-4 ASMfile editing area

- Output area: consists of three parts, namely the generation window, the debug window and the search window.

The Build window displays the execution process and results of compilation, download, etc.

The debug window is used to view and modify variables.

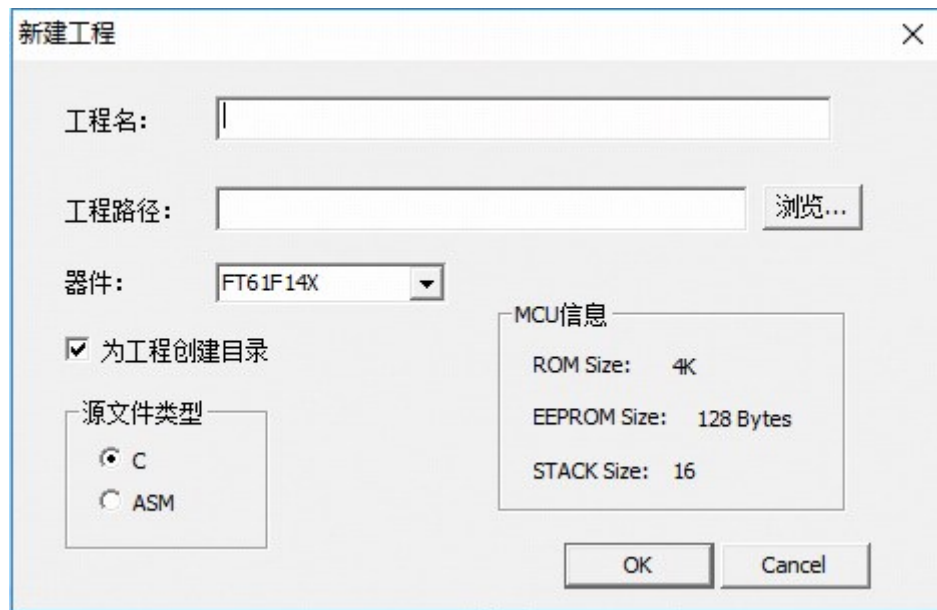
The Find window is used for the Find in Files command.
- Observation area: includes four parts, which are RAM window, EEPROM window, stack window and register window. It will be described in detail in the "Debugging Window" section.
- Status bar: display progress bar, chip status, current status PC value and firmware version number, as shown in the figure 2-5 shown. If the firmware is not connected, "Not connected" will be displayed at the firmware version number.



picture2-5Status Bar

2.1.3 New Construction

Select the menu "Project" -> "New Project", the "New Project" dialog box pops up, as shown in the figure 2-6 shown. Enter "work Program Name", click the "Browse" button to select "Project Path", and select "Device". If you need to create a project folder, Please check "Create directory for project", and finally select the source file type: C file or assembly ASM file, click OK. A new project can be created.



picture2-6New Construction

After the new project is completed, a source file is automatically generated by default. You can write programs in the source file, or delete and re-import the source file.

-Engineering area:

Right-click"Source File"Select Add File to add source files, or Delete File to delete source files.

Right-click"EE Data File"Select Add File to addEEPROMData files, select "Delete file" to deleteEEPROMdata files.

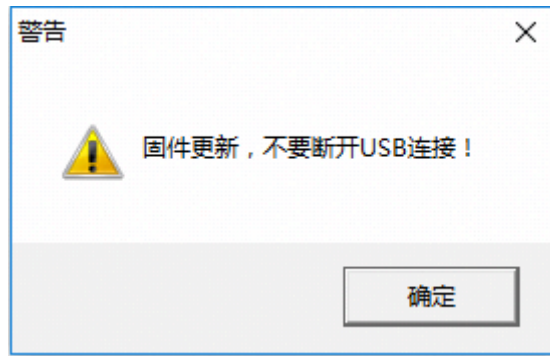
Right-click"Include File"Select "Add File" to add the referenced file, or "Remove File" to delete the referenced file.

Right-click"LIB File"Select "Add File" to add the library file, select "Delete File" to delete the library file pieces.

Note: If the added file is not in the project directory, it will be automatically copied to the project directory.

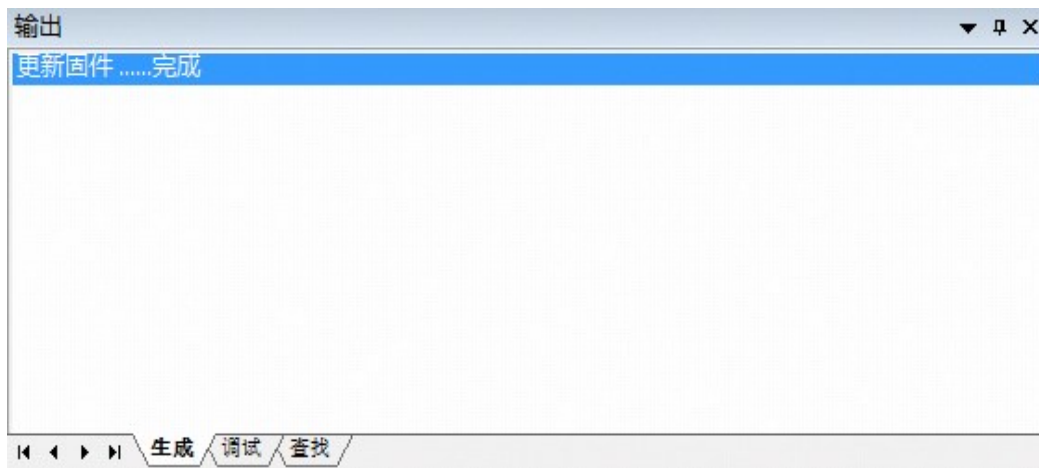
2.2update firmware

Generally, whenFMDIDsoftware link firmwareFMD-LinkAfter that, the firmware version will be automatically detected. If the firmware version is low, theIDEA window will pop up automatically, prompting whether to update; or select the menu "Help" -> "Update Firmware" to update, as shown in the figure below.



Click OK to start updating the firmware, and the generation window in the output area will display "Update firmware. ...", indicating that the firmware update is in progress, the progress bar in the status bar will display the update progress, and the firmware will light up in red. Note: Be sure not to disconnect during the update processUSB connect!

When the build window of the output area displays "Update firmware...Completed", as shown in the figure below, the firmware is green, indicating that the update is successful, no need to disconnectUSBconnected and ready to use. You can see the change of the firmware version number after the upgrade in the status bar.



2.3Edit function

2.3.1edit text

1) Select text and code

There are several ways to select text for the editor as follows (where the first5way to select consecutive content, after2way to select only the rectangular part of the text, not the entire line):

- ① Select menu "Edit" -> "Select All" , or press the shortcut keyCtrl+A, you can select all content;
- ② Hold down the left mouse button and drag the cursor over the text you want to select;
- ③ Click the line number on the far left of the editing area to select the line, and drag multiple line numbers with the mouse to select multiple lines;
- ④ Click on the first row number of the multiple rows you want to select, press and holdShift, click the last line number;

- ⑤ Click the area to be selected with the mouse, press and holdShift, then press the desired direction key to select continuous content;
- ⑥ press and holdAlt, hold down the left-click button, and drag the cursor over the text you want to select;
- ⑦ Click the area to be selected with the mouse, press and holdShift+Alt, and then press the desired direction key, as shown in the figure2-7shown.

```
while(1)
{
    temp1 = temp;
    temp = tmp;
    tmp = temp1;
    k=i+j;
}
```

picture2-7choose text

2) Change the text and code

The editor supports manyMicrosoft WordSame text manipulation features as word processing applications:

- ① "cut" (Ctrl+X/Shift+Delete),"copy" (Ctrl+C) and "paste" (Ctrl+V);
- ② useInsertSwitch the code editor between "overtyping" mode and "insert" mode;
- ③ useDeleteandBackspaceText or code may be removed;
- ④ Drag the text while it is selected or press and holdCtrlKey-drag text to move or copy text;

3) Multi-line comments

In the editor, in order to facilitate the debugging of the program, sometimes it is necessary to comment multiple lines of code.

Use the mouse to select the multi-line code that needs to be commented, and click the toolbar



to comment out the selected code. select with mouse

Select the multiple lines of code that need to be uncommented and click the toolbar



to uncomment the selected code.

2.3.2browse code

1) Find

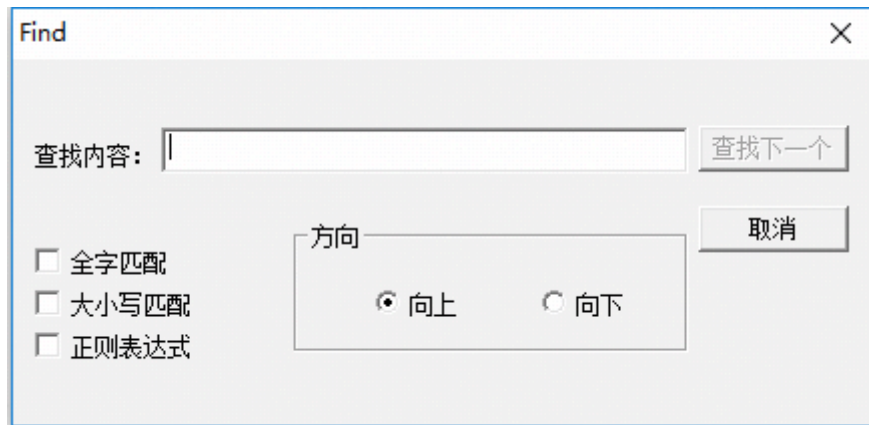
Find is used to search for text strings in the code of the currently open file.

Select the menu "Edit" -> "Find", or press the shortcut keyCtrl+F, or click the toolbar



, you can play

The "Find" dialog box appears, as shown in the figure2-8As shown, enter the content you want to find, check whether you want whole word matching, case matching or regular expression, and select the search direction, then click "Find Next".



picture2-8find

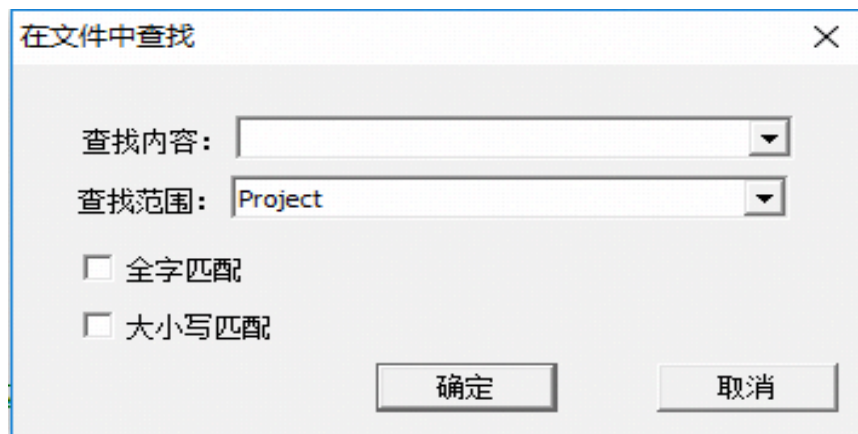
2) Find in file

Find in Files searches for text strings in the code of all files in the project file.

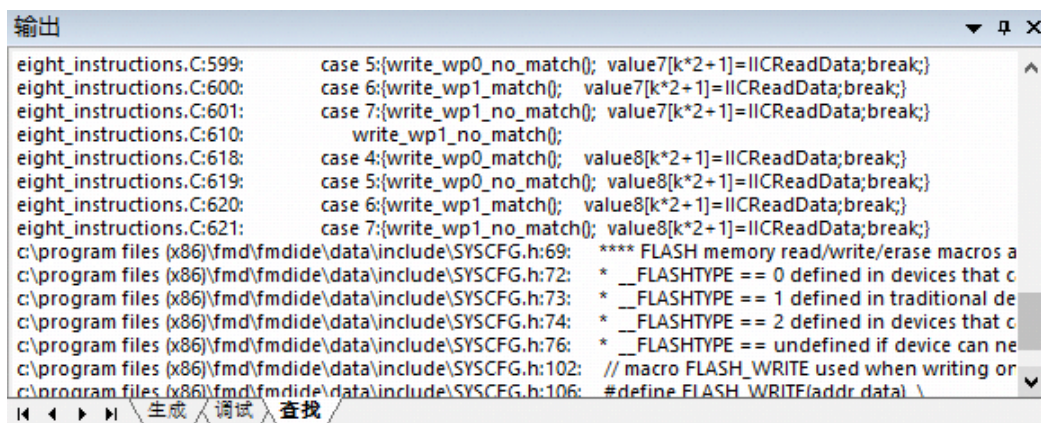
Select the menu "Edit" -> "Find in File", or click the toolbar , you can open the "Search in file"

"Find" dialog box, as shown in the figure 2-9As shown, enter the content you want to find, check whether you want to match whole words or uppercase and lowercase, and click "OK".

The search result will be displayed in the search window of the output area, including the corresponding file name, line number and existing statement, as shown in the figure 2-10As shown, double-click to locate the row in the editing area.



picture2-9find in file



picture2-10Output area search window

3) Replace

The "Replace" command is equivalent to "Find and Replace", which searches the code of the currently open file for text strings and replaces them with other content as needed.

Select the menu "Edit" -> "Replace", or press the shortcut keyCtrl+H, the "Replace" dialog box will pop up, as shown in the figure 2-11as shown, enter the content you want to find and replace, check whether you want whole word matching, case matching or regular expression, and click "Find Next", "Replace" or "Replace All" will do.



picture2-11replace

4) Bookmarks

Bookmarks can be set in the editor to mark and locate lines of code for easy browsing.

Click the line where the bookmark needs to be set with the mouse, make the cursor stay on the line of the statement, and select the menu "Edit" -> "Bookmark" ->

"Add/Remove Bookmarks", or press the shortcut keyCtrl+F2, or click the toolbar, the first click is to add a book
bookmark, click again to delete the bookmark.

When there are multiple bookmarks, you can select the menu "Edit" -> "Bookmarks" -> "Jump

to the next bookmark", or press the shortcut keyF2, or click the toolbar



Skip to next bookmark, also select menu

"Edit" -> "Bookmarks" -> "Skip to previous bookmark" , or press the shortcut keyShift+F2, or click the toolbar



Skip to the previous bookmark.

When you don't need bookmarks, you can select the menu "Edit" -> "Bookmarks" -> "Delete All Bookmarks", or press the

hotkeyCtrl+Shift+F2, or click the toolbar to delete all bookmarks.



2.3.3Accessibility

1) Syntax coloring

The editor willCO keyword coloring of assembly syntax to increase code readability.

2) Automatic bracket matching

When the user types an opening brace, the closing brace automatically aligns to the opening brace when the matching closing brace is typed again on another line.

When the cursor is placed on the side of curly brackets, square brackets, or parentheses, the matching brackets will be highlighted with a green bottom rectangle, as shown in the figure2-12shown.

```
while(1)
{
    temp1 = temp;

    temp = tmp;

    tmp = temp1;

    k=i+j;
}
```

picture2-12Matching brackets are highlighted

3) go to definition

Use the mouse to select the name of the function or variable you want to jump to, select the menu "Edit" -> "Jump" -> "Go to Definition", it will jump to the corresponding position, and a cyan arrow will appear pointing to the function and variable. Definition.

Note: This function can only be used after the assembler has been compiled.

2.4 Compile and download

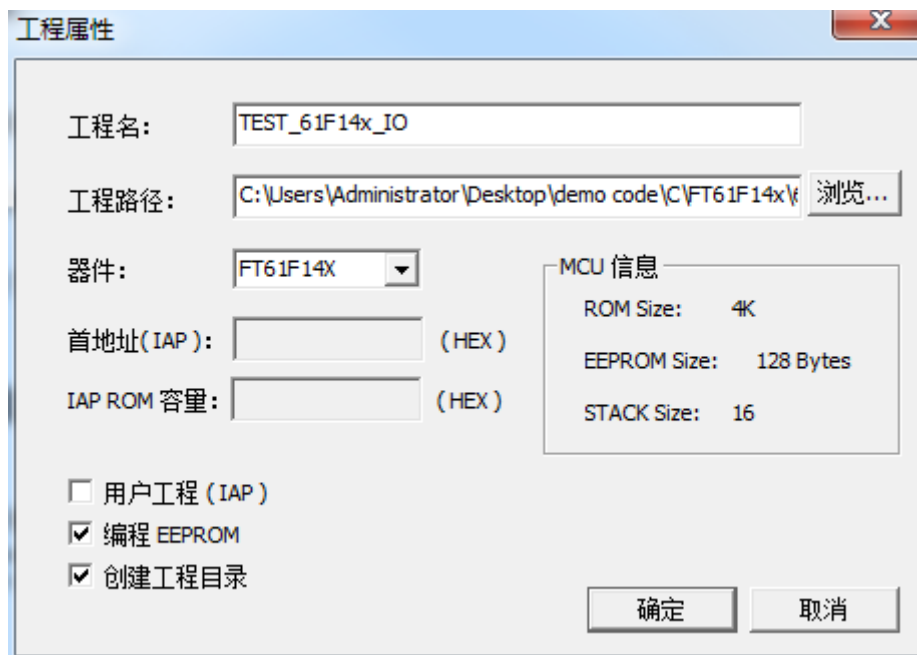
The steps to compile and download are as follows:

- ① Set project properties;
- ② Set chip configuration word information and compile;
- ③ Project file generation and download;
- ④ The output area generates the result;

2.4.1 Engineering properties

Right-click in the project area Device "Select "Project Properties" to change the project properties, as shown in the figure 2-13. In addition to the basic information such as project name, project path, device, etc., you can also set whether to "program EEPROM" etc., when the program is IAP. Program, you can set the "first address" and capacity of the compiled.

support IAP Program models are: FT61F08X, FT62F08X, FT61F14X, FT61F0AX, FT64F0AX, FT67F0AX.



picture2-13 Engineering properties

2.4.2 Chip configuration word and compilation

The chip configuration word must be set before compiling.



picture2-14 Chip Configuration Words (with FT61F14X example)

Select menu "Debug" -> "Build (F7)", or click the toolbar  Generate the object file, the compiler will pop up

Options dialog box, as shown in the figure 2-14A as shown, the cursor clicks on the Options dialog box to display the corresponding text description. different models of devices

OptionsThe information will be slightly different, please select the corresponding options according to your needs, click OK to start compiling.

If you need to compile and download repeatedly, and the chip configuration word information does not need to be changed, you can checkOptionsIf the lock option in the lower left corner of the dialog box is selected, the dialog box will not pop up when compiling next time, and compile according to the existing settings.

If the chip configuration word needs to be modified after locking, or the chip configuration word needs to be unlocked, select the menu "Debug" ->

"Options" , or click the toolbar  , you can modify the chip configuration word and cancel the lock.

2.4.3 Project file generation and download

Connect according to the correct wiring FMD-Link After the firmware and chip, select the menu "Debug" -> "Generate and download

Download" or click the toolbar  , will perform operations such as compiling, erasing, downloading, resetting and starting simulation, erasing and downloading in the process of Link The firmware flashes red and green lights alternately, green light when successful, and red light when it fails.

After the download is successful, the simulation toolbar will become valid. After starting the simulation, if the file is re-edited and saved, the simulation toolbar will become invalid. It needs to be recompiled and downloaded to be valid.

If you need to select operations such as erasing and downloading according to your own needs, after completing the compilation, select the menu "Debug" , where "erase" and "download" are only for MCU of Flash District and Options area to operate, "Erase EEPROM" and "download EEPROM" yes only MCU of EEPROM area to operate. "download" and "download EEPROM" No compilation is performed, just a separate download.

2.4.4 Output area to generate results

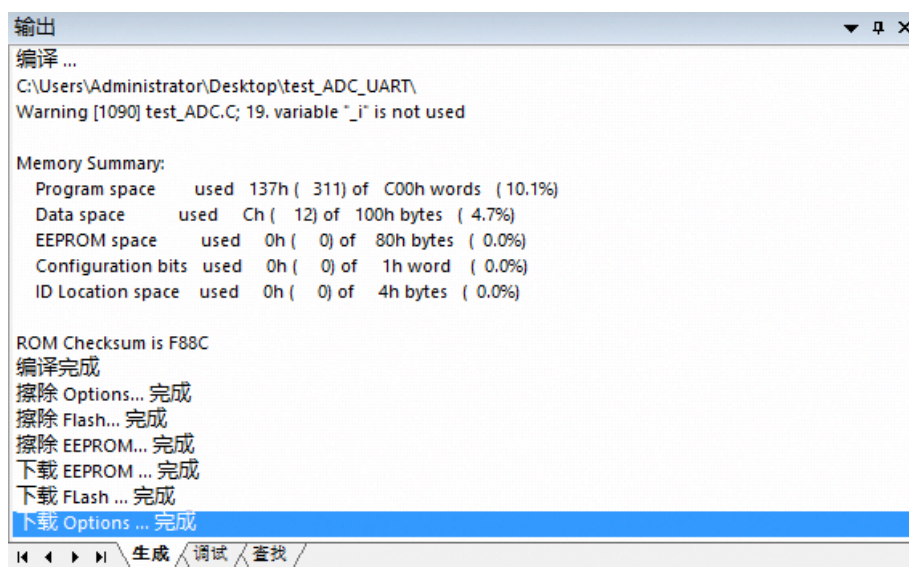
The generation window in the output area is used to display the execution process and results of compilation, download, etc., as shown in the figure 2-15 shown.

"Compile": The build window displays the results of the compilation.

- When the compilation is successful, the build window displays ROM, RAM and EEPROM The size of the used space, the checksum of the file, and the compilation is completed.
- When compilation fails, corresponding warnings and errors will be displayed in the generation window. The errors displayed by compilation include the error file, line number and error reason. Double-click to locate the line.

"Generate and Download": The Build window displays the compilation, erasing and downloading process and results.

- If a certain step in the erasing or downloading process fails, the download will stop and the generation window will show that the step failed;
- If the chip is not connected or the chip wiring is wrong, it will prompt "No chip detected";
- If the actual chip model is the same as IDE Device model mismatch on the read ICD error, it will prompt "target chip does not match" ;



picture2-15Output area generation window

2.4.5 Other functions

1) Export encryptionHEX

Select the menu "Project" -> "Export Encryption"HEX", enter in the pop-up dialog 4byte16base key, can generate encryptedHEXdocument. When the burner needs to use encryptionHEXWhen burning, you will be prompted to enter the key to decrypt and import correctlyHEX.

Note: EncryptedHEXCustomized functions for users, the key needs to match the information of the chip to be programmed normally, please consult for detailsFMDtechnical support.

2) Import file to burn

In addition to generating and downloading the project file, you can also import the file for downloading, select the menu "Project" -> "Import File Burning", and select "Device", "Device" in the opened dialog box. Flashfile" and "EEPROMfile" and OK, the generation window of the output area will be displayedHEXinformation, including generatedIDVersion number, device, Flash Checksum and Optionsoptions, etc., and automatically burn into the chip at the same time.

3) Read the check code

Select the menu "Project" -> "Read Check Code", you can read the information of the currently connected chip, and the read content is displayed in the generation window of the output area. The information includes Flash Checksum, EEPROM Checksumand Options.

Note: Before reading the verification code, you need to open the project file, and the device model of the project should match the read chip model.

4) EEPROMset up

a)importEEPROMdocument

EEPROMhave4way to import:

- ① Menu "Project" -> "Import"EEPROMdocument";
- ② Right-click in the project areaEE Data File"Select "Add File";
- ③ DEinstruction definition data;
- ④ existEEPROMwindow editing, inEEPROMDouble-click to modify the data in the window, and after modification,EEPROMClick anywhere in the window or press the Enter key, the modified value will be written into the chip immediately, and read back and displayed (this method can only be performed after starting the simulation) .

When the menu is importedEEPROMfile, whileDEThe data is defined, then after compilationDEDefines the data that will be imported by the overlay file.

Notice:

- importedEEPROMThe file must match the chipEEPROMcapacity, otherwise it cannot be imported, and an error will be prompted;
- If importedEEPROMIf the file is not in the project directory, it will be automatically copied to the project directory;
- IDEThe chip is erased by default when downloadingEEPROMarea, so if there is no importEEPROMfile and there is no correctEEPROMFor write operations, after each re-downloadEEPROMThe window will appear fullFF;

b)deleteEEPROMdocument

delete importedEEPROMfile has2ways:

- ① Menu "Project" -> "DeleteEEPROMdocument";
- ② Right-click in the project areaEE Data File"Select "Delete File";

c)exportEEPROM

Select menu "Project" -> "Export"EEPROM", you can export the currentEEPROMdata in the window.

Notice:EEPROMThe data is related to the operation of the program, if the program is modifiedEEPROMvalue, then the output after debuggingEEPROMData is possible and compiled outputEEPROMData is different.

2.5Simulation operation

After performing a "build and download" action,IDEThe simulation starts automatically.

To execute the "Download" operation, select the menu "Debug" -> "Start/Stop Debugging" , or click the toolbar icon ,

or press the shortcut key "Shift+F6" to enter the simulation. The way to exit the simulation is the same as the way to enter the simulation.

After entering the simulation, a cyan debugging arrow is displayed in the blank space on the left side of the editing area, pointing to the current program PC address, as shown in the figure 2-16 shown, the program stops by default at 0x0000 address, i.e. PC direction 0x0000.

2.5.1 breakpoint control

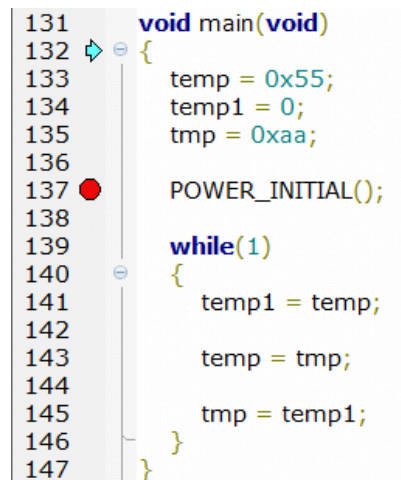
Currently IDE Supported Device Models FT60F01X, FT60F02X, FT60F21X and FT62F21X Only allowed 1 breakpoint, other models allow 3. When the number of breakpoints is exceeded, the first breakpoint will be automatically deleted.

How to set breakpoints:

- ① Click the statement line where you want to set a breakpoint, and then select the menu "Debug" -> "Add/Remove Breakpoint", or press the shortcut key F9, or click the toolbar icon, ,
- ② After the line number of the statement where the breakpoint needs to be set, click the left mouse button to set the breakpoint;

No matter which way you set it, the first time it is set to add a breakpoint, and the second time it is set to remove the breakpoint. Breakpoints are marked with red circles, as shown in the figure 2-16 shown.

Select the menu "Debug" -> "Remove All Breakpoints", or press the shortcut key Ctrl+Shift+F9, or click Tools bar icon to delete all breakpoints that have been set. 



picture2-16 Debug arrows and breakpoints

2.5.2 executive control

1) run(Run)

Select the menu "Debug" -> "Run", or press the shortcut key F5, or click the toolbar icon , the program will Running at full speed.

If a breakpoint is set before execution and the breakpoint can be reached, the program runs to the breakpoint and stops, at this time, the cyan debugging arrow

It coincides with the red breakpoint, as shown in the figure2-17shown.RAMwindow,EEPROMThe window, stack window, and register window refresh and display the chip status in the status bar.

If the breakpoint cannot be reached or the breakpoint is not set, the program will always run at full speed, and you can see the state of the chip at this time in the status bar.

```

131 void main(void)
132 {
133     temp = 0x55;
134     temp1 = 0;
135     tmp = 0xaa;
136
137     POWER_INITIAL();
138
139     while(1)
140     {
141         temp1 = temp;
142
143         temp = tmp;
144
145         tmp = temp1;
146     }
147 }
```

picture2-17The debug arrow reaches the breakpoint

2)stop(Stop)

Select menu "Debug" -> "Stop", or press the shortcut keyShift + F5, or click the toolbar icon ,

A program running at full speed will stop.

After execution is complete,RAMwindow,EEPROMThe window, stack window and register window will refresh and display the chip status in the status bar.

3)track(Step)

Select the menu "Debug" -> "Trace", or press the shortcut keyF11, or click the toolbar icon ,

the program will

Single-step run once, execute one line of program at a time, and stop after executing the line of program. When the program runs toCall/LCALLWhen the program instruction is executed, enter the sub-function.

Each time the "trace" operation is performed,RAMwindow,EEPROMThe window, stack window and register window will refresh and display the chip status in the status bar.

4)single step(Step over)

Select the menu "Debug" -> "Single Step", or press the shortcut keyF10, or click the toolbar icon ,

program

It will step through once, execute one line of program at a time, and stop after executing the line of program. The only difference from "trace" is that when the program runs toCall/LCALLWhen the program is instructed, it does not enter the sub-function, but runs the sub-function at full speed and stays at the next instruction.

Each time a "single step" operation is performed, RAM window, EEPROM window, stack window and register window will refresh and display the chip status in the status bar.

5)run to cursor(Run to Cursor Line)

Left-click the statement line that needs to be stopped, place the cursor on the statement line, and select the menu "Debug" -> "Run"

to the cursor,"or press the shortcut key Ctrl+F10, or click the toolbar icon, the program runs to the cursor and stops end, RAM window, EEPROM window, stack window and register window will refresh and display the chip status in the status bar.

Note: If the selected statement line program cannot be reached, the program will run at full speed and will not stop at the cursor.

6)reset(Reset)

Select the menu "Debug" -> "Reset", or press the shortcut key Ctrl+F5, or click the toolbar icon , but program reset, PC restore to start address, cyan debug arrow points to address 0x0000.

2.5.3debug window

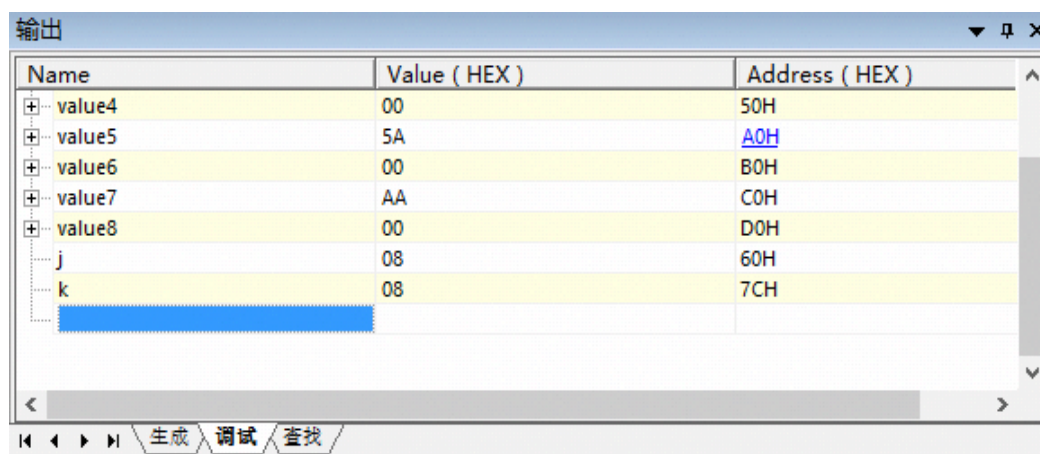
1) Variable window

IDE provides a window where you can view and modify variables, that is, the debug window in the output area.

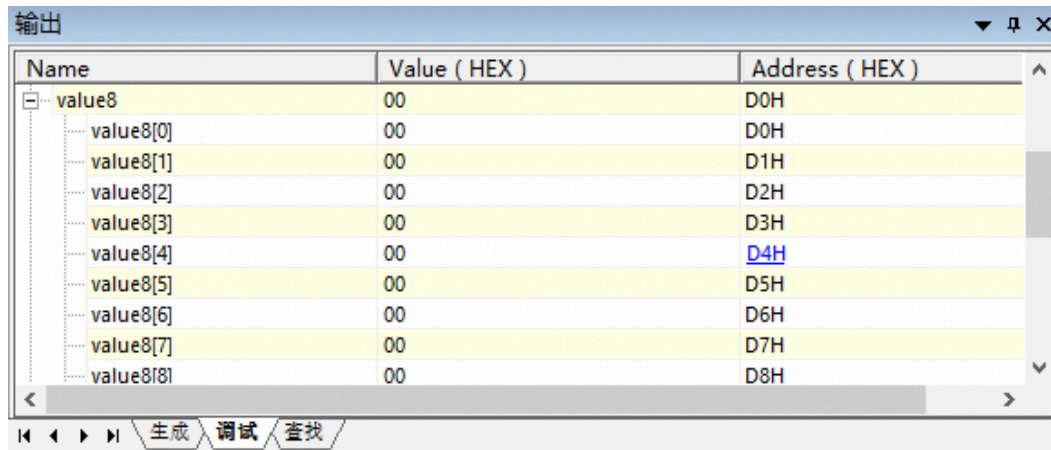
in the debug window "Name" Enter the variable name to be observed in the column, and the current value of the variable and the corresponding address will be displayed during debugging. When the observed variable is an array, the first address and the value of the first address are displayed. Click the "+" in front of the array name to see other addresses and corresponding values in the array, as shown in the figure. 2-18 and 2-19 shown.

In the variable corresponding to the variable that needs to be modified "Value" In the column, double-click the value to modify it. After the modification is completed, click the left mouse button at any position in the output area or press the Enter key, that is, the modification is successful and the modified value is displayed.

Note: You can only view global variables, not local variables.



picture2-18Output area debug window



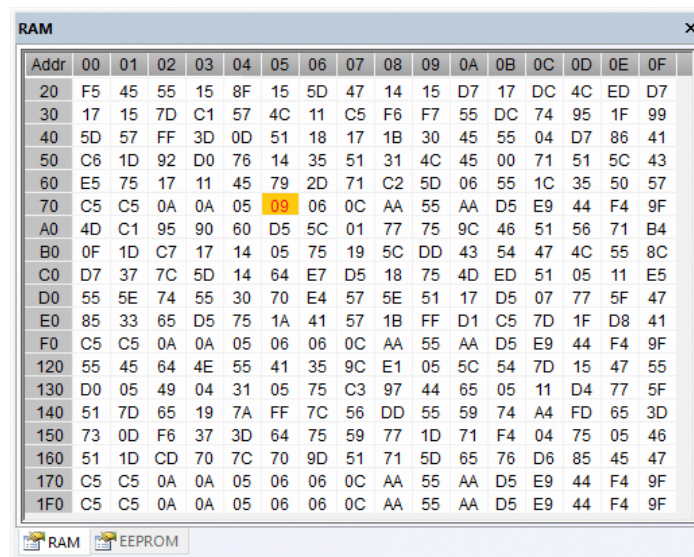
picture2-19 Array expansion of debug window in output area

2) RAMwindow

RAMThe window displays all the current state of the chipRAMvalue, as shown in the figure2-20shown.

The display will be refreshed when debugging, there are changesRAMValues are highlighted with red callouts.

After starting debugging, you can double-click to modifyRAMvalue, modified inRAMClick anywhere in the window or press the Enter key to confirm, the modified value will be written into the chip and read back to display.



picture2-20 RAMwindow

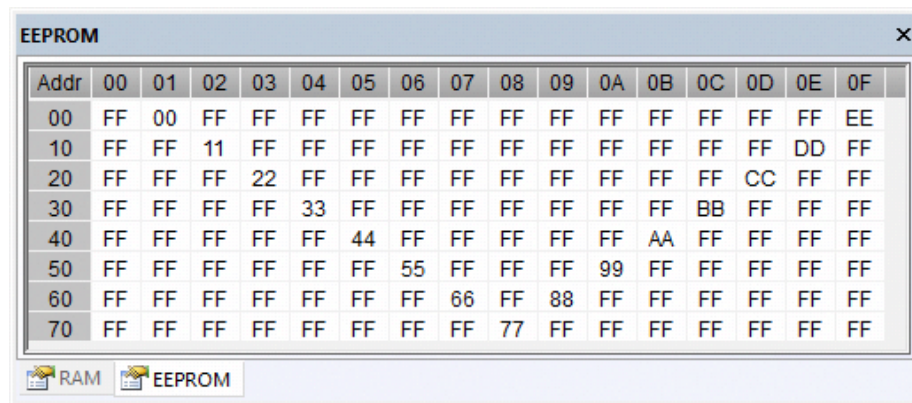
3) EEPROMwindow

EEPROMThe window displays all the current state of the chipEEPROMvalue, as shown in the figure2-21shown.

The display will be refreshed when debugging, there are changesEEPROMValues are highlighted with red callouts.

andRAMThe window is the same, you can edit in the window after starting debugging, double-click to modifyEEPROMvalue, modified in EEPROMClick anywhere in the window or press Enter to confirm,The modified value will be written into the chipand read back the display.

aboutEEPROMFor details on import and export settings, please refer to "EEPROMSettings" section.



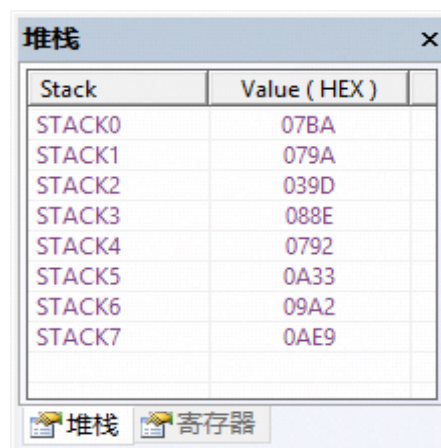
picture2-21 EEPROMwindow

4) Stack window

The stack window displays the stack values, as shown in the figure2-22shown. The stack value cannot be modified, and is only used to observe the push and pop of the chip.

Different types of chips have different stack level limits. If the number of call levels exceeds the limit of the chip, the program will not run correctly.

Row.



picture2-22stack window

5) Register window

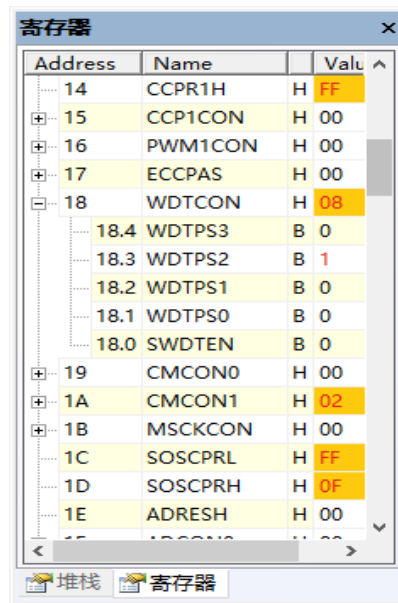
The register window is shown in the figure2-23show, showSFRSpecial function registers, including register address, register name, register value and the displayed base (Hrepresents decimal,Bmeans binary) . If a register supports bit functions, then Display "+" before its nameclick "+" to expand the display bit variable and the value of the corresponding bit, click "-" to collapse bit variable.

The display will be refreshed during debugging, and the changed register value will be highlighted in red.

After starting the simulation and debugging, double-click the value of the register to modify it. After modification, click anywhere in the register window or press the Enter key to confirm, and the modified value will be written into the chip.

Note: The value of the bit cannot be edited separately. In addition, if the bits of some registers are read-only, it will prompt that the register is written to fail.

default.

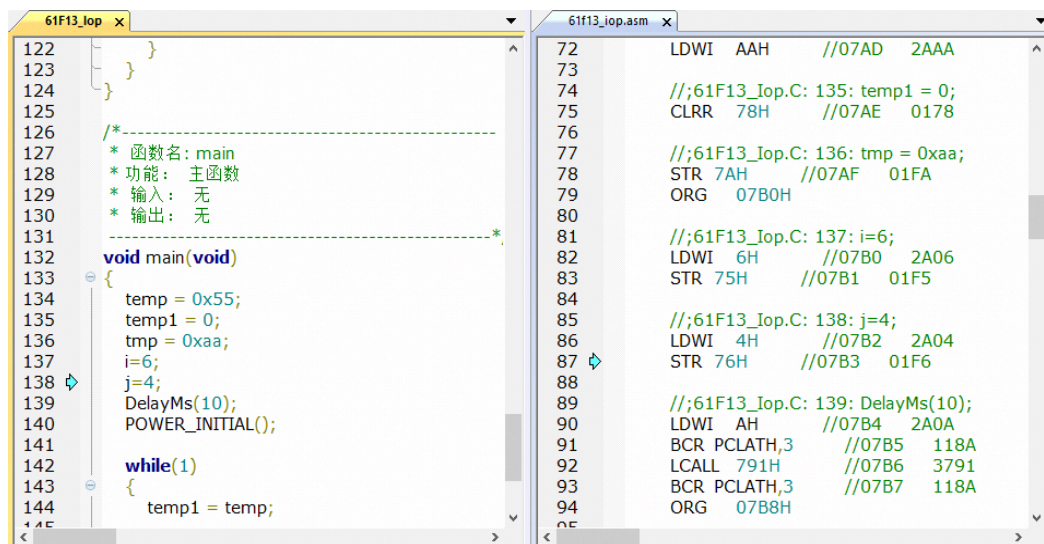


picture2-23Special Function Register Window

6) Assembly debug window

The assembly debug window is used to display the disassembly code corresponding to the code and PC value, the cyan debug arrows correspond to each other in the source code and disassembly code area, as shown in the figure 2-24 shown.

In the emulation state of the program, the assembly debug window will be opened automatically when the "trace" and "single step" operations are performed. You can also open the assembly debug window by selecting the menu "Debug" -> "Assembly Debug".



picture2-24Assembly debug window

2.6 External power supply simulation description

External power supply download simulation operation steps:

General steps(applies toFMDAll series8bit MCU):

- ① WillFMD Linkpass throughUSBcable to connect to the computer;
- ② When downloading the simulation with external power supply, you need toFMD LinkInterfaceVMCUandEXVDDshort circuit (see1.2Festival);
- ③ Connect the power supply of the target board to the power supply of the chipVDDThe connection of the foot is disconnected;
- ④ WillFMD Linkthe otherEXVDDThe interface is connected to the power supply of the target board, and theFMD LinkofVDD interface to the chipVDDfoot;
- ⑤ OpenFMD IDEsoftware, you can download and simulate operations according to the normal process;

Uninterruptible power programming steps(applies toFT60F21X / FT61F13X / FT61F08X / FT62F13X / FT62F08X):

- ① WillFMD Linkpass throughUSBcable to connect to the computer;
- ② When downloading the simulation with external power supply, you need toFMD LinkInterfaceVMCUandEXVDDshort circuit (see1.2Festival);
- ③ WillFMD Linkthe otherEXVDDThe interface is connected to the power supply of the target board, and theFMD LinkofVDDThe interface is connected to the external reset pin of the chipMCLRB;
- ④ OpenFMD IDEsoftware, open the project properties dialog box,Check the uninterruptible power burning option, as shown in the figure2-25, then openOptionsdialog, make sureMCLREoption selectionMCLRreset pinAfter that, you can follow the normal process to download simulation and other operations;

Note: the outside of the chipMCLRThe reset function must be enabled before the simulation of continuous power-on programming can be realized;



picture2-25Uninterrupted programming

3Burn Instructions

3.1Burner software

FMDWriterIt is Huimang Microelectronics Co., Ltd.FMDAll series8bit MCUUser-provided burning software.

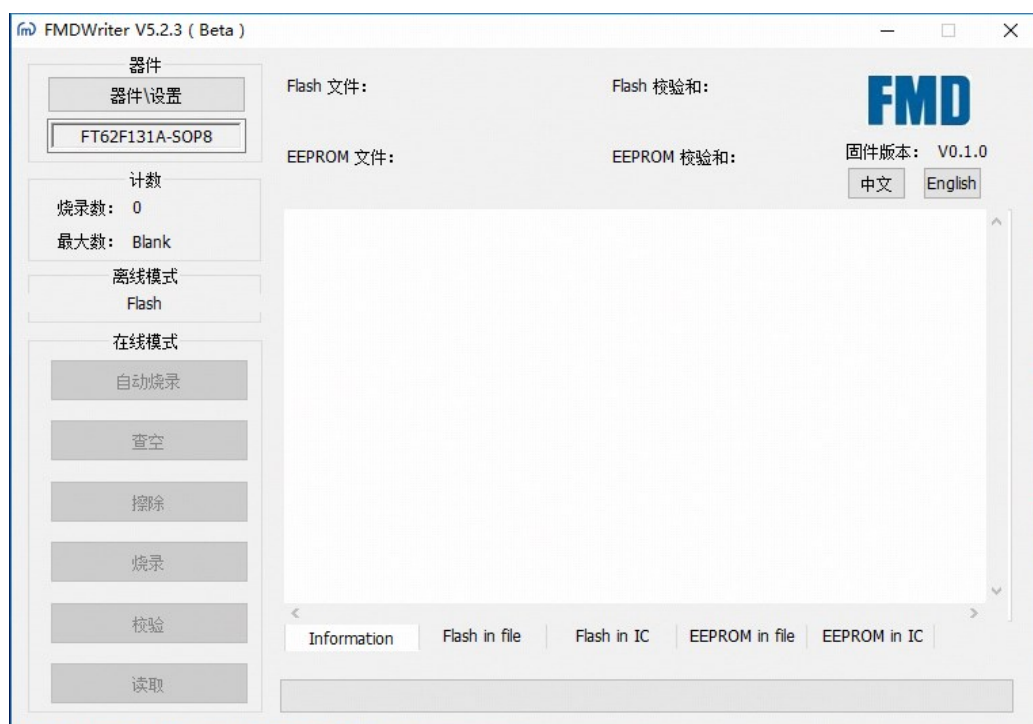
3.1.1Software Installation

FMDWriter PCThe terminal software is an installation-free version, please go to the official websitewww.fremontmicro.com Download the latest version of the burner software. decompress directlyFMDWriter.rararrivePCanywhere, then double-click FMDWriter.exejust run (withV5.2.3version as an example).



3.1.2Software interface description

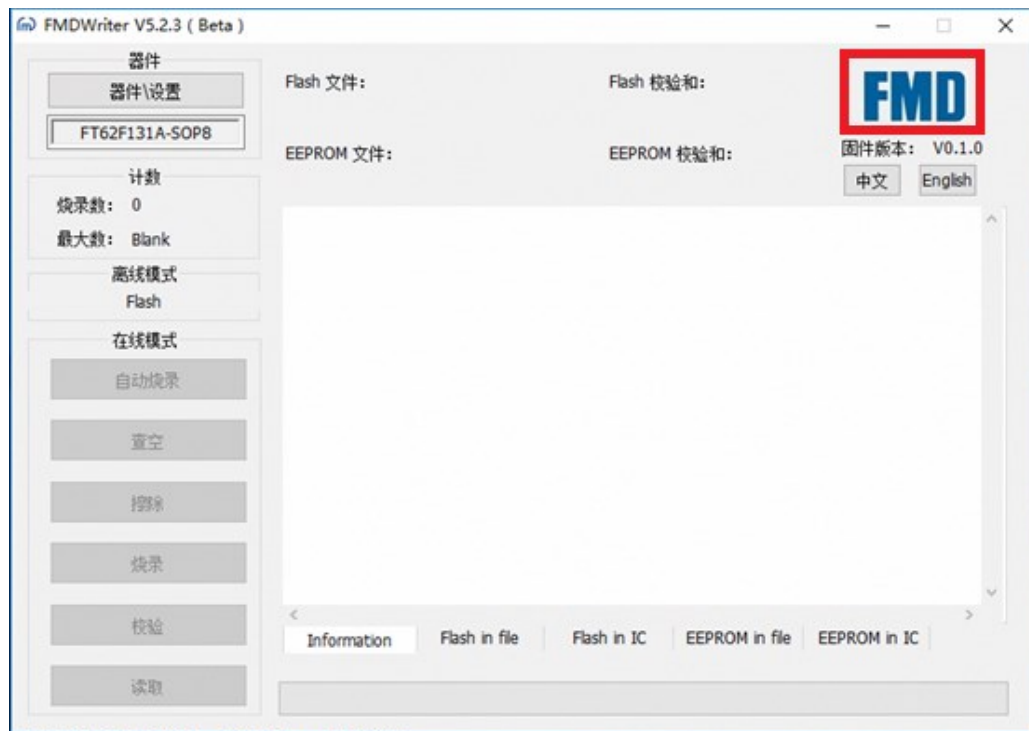
runFMDWriter.exe, the main user interface after the software is opened is as shown in the figure below, if the firmware is not connected, then InformationThe interface will show that the firmware is not connected.



Among them, the "FMD" icon for updating firmware, "Chinese" and "English" For Chinese and English interface switch.

3.2 update firmware

Generally, when FMDWriter software link firmware FMD-Link After that, the firmware version will be automatically detected. If the firmware version is low, the Writer A window will pop up automatically, prompting whether to update; or click the "" in the upper right corner of the software FMD" The icon is updated as shown in the image below.

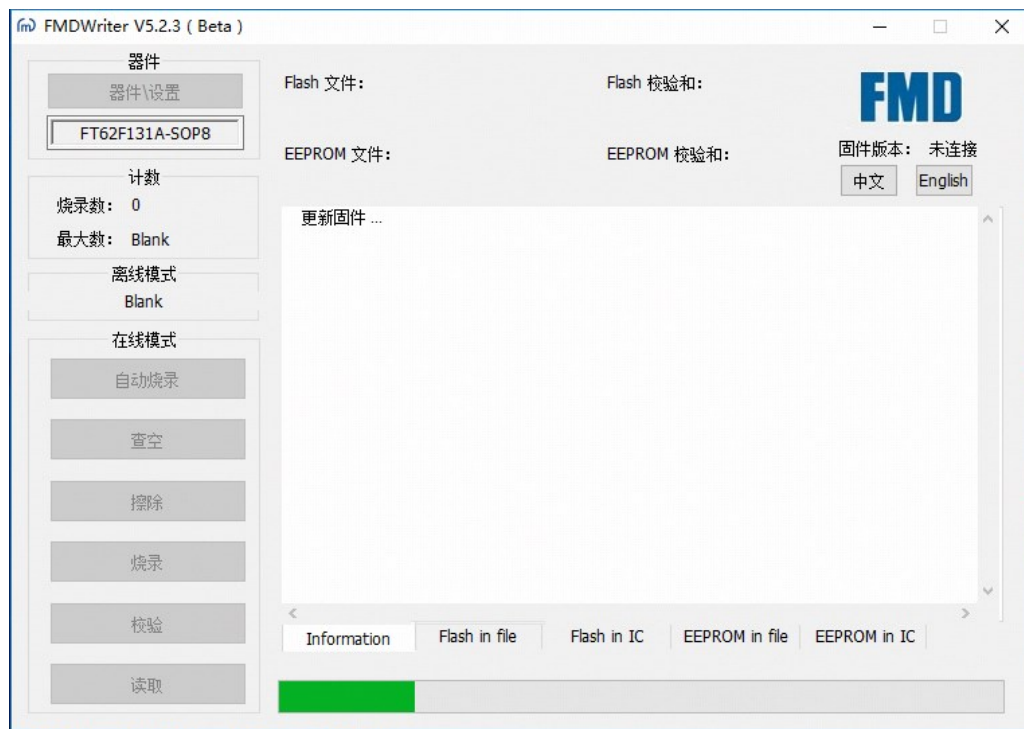


A warning window will pop up, as shown below.



Click "OK", the firmware starts to update, at this time FMD-Link The red light is on, and the upper computer displays "Update firmware..." ,Enter

The degree bar shows the update progress, as shown in the following figure.



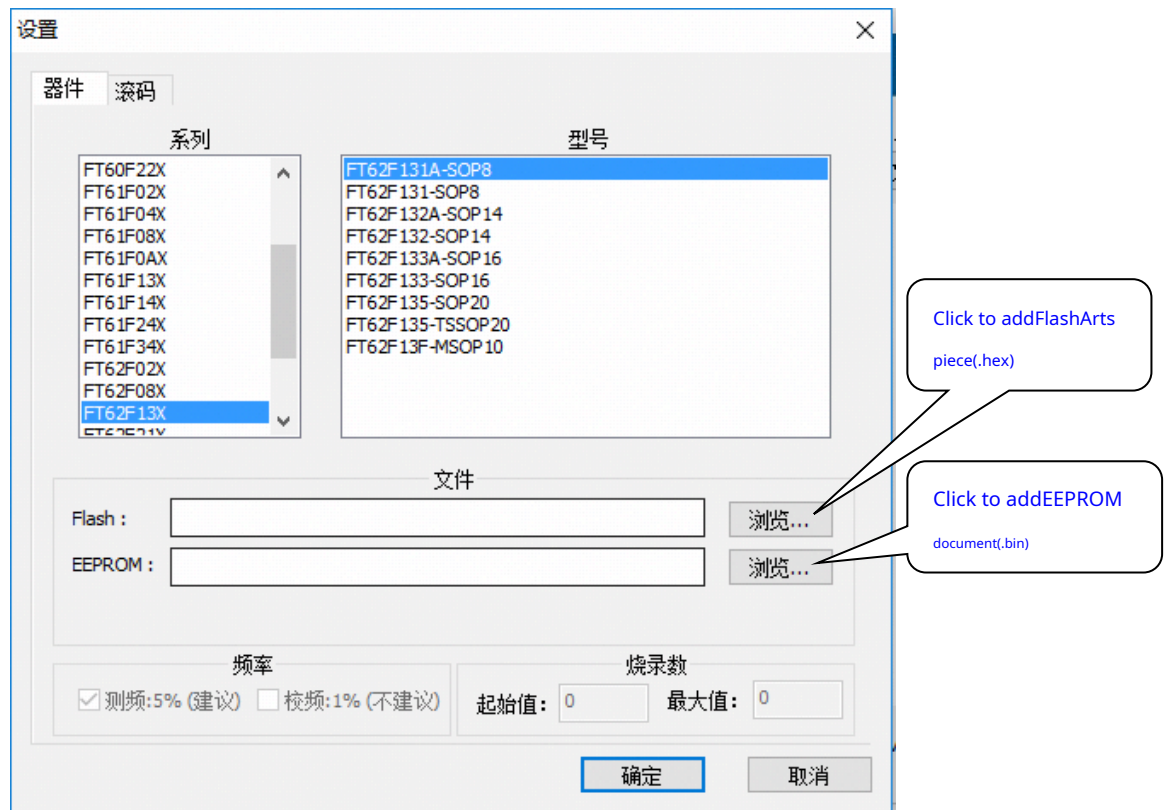
Note: Be sure not to disconnect during the update process USB, do not turn off the host computer software.

After the update is successful, FMD-Link The green light is on, the software interface is blank, FMDWriter Automatic reset into normal working mode, no need to re-plug USB interface, the updated firmware version number will be displayed in the upper right corner. If the update fails, repeat the above process.

3.3 Online burning operation steps

Connect according to the correct wiring FMD-Link After firmware and chip:

- ① Click "Device\Settings", the setting window pops up.
- ② Select the device model to be programmed, Flash document, EEPROM files, etc., you can select only Flash file or just select EEPROM file, or both, supported IAP Program the device (FT61F08X, FT62F08X, FT61F14X, FT61F0AX, FT64F0AX, FT67F0AX) can also choose IAP document.

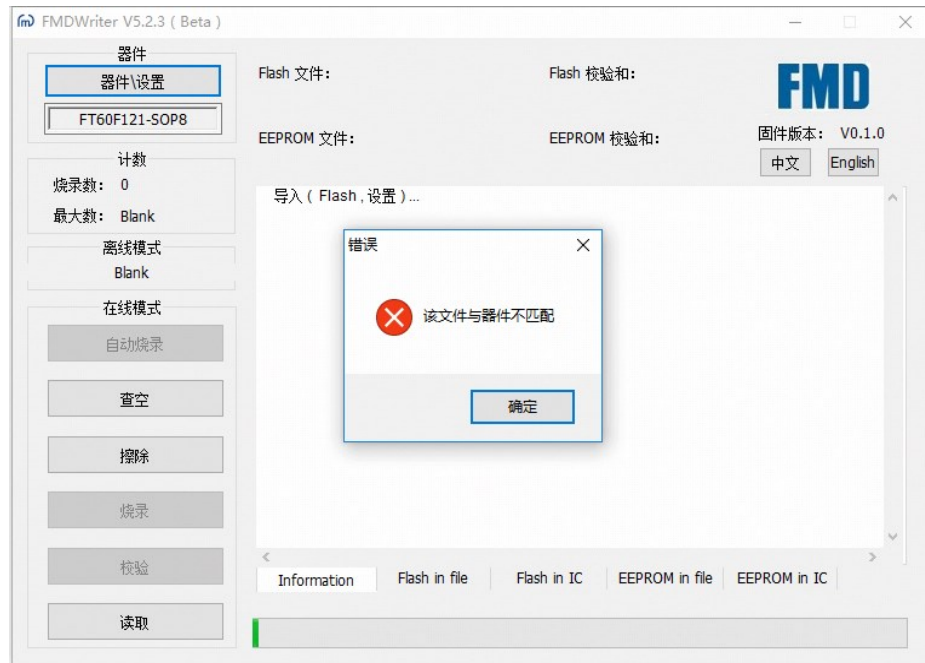


- ③ Click the "Rolling Code" button (optional) on the right side of the device to configure the rolling code (add at least one file first: .hex or .bin).
For details, see the "Rolling Code" explanation.

- ④ Click OK and the added files will be loaded automatically.

Notice:

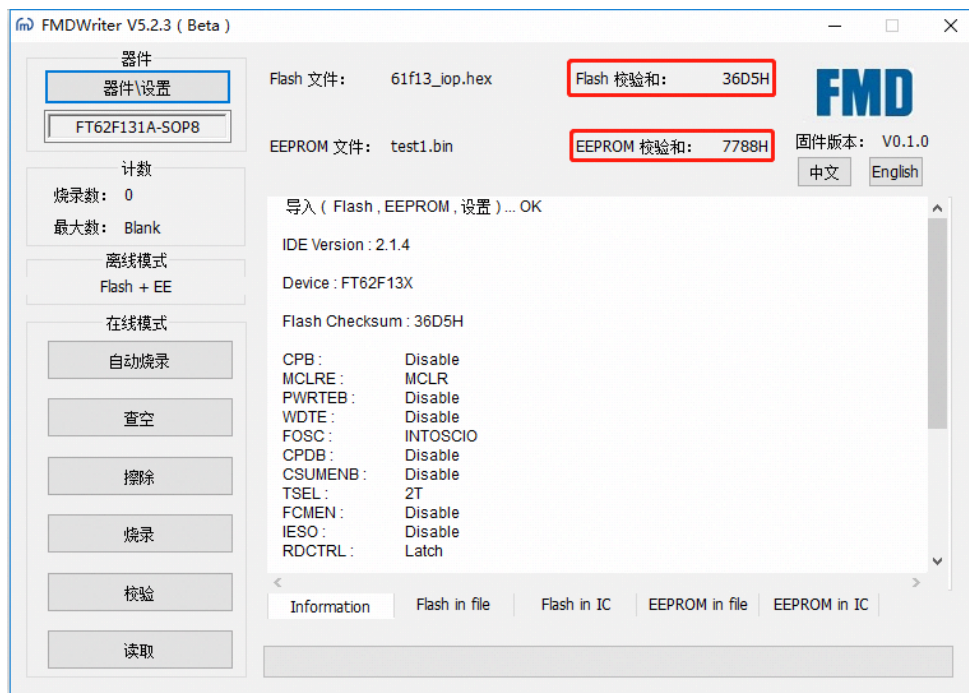
- If selected Flash If the file does not match the device name, a pop-up window will prompt that the file does not match the device, and you need to go back to the steps ①.



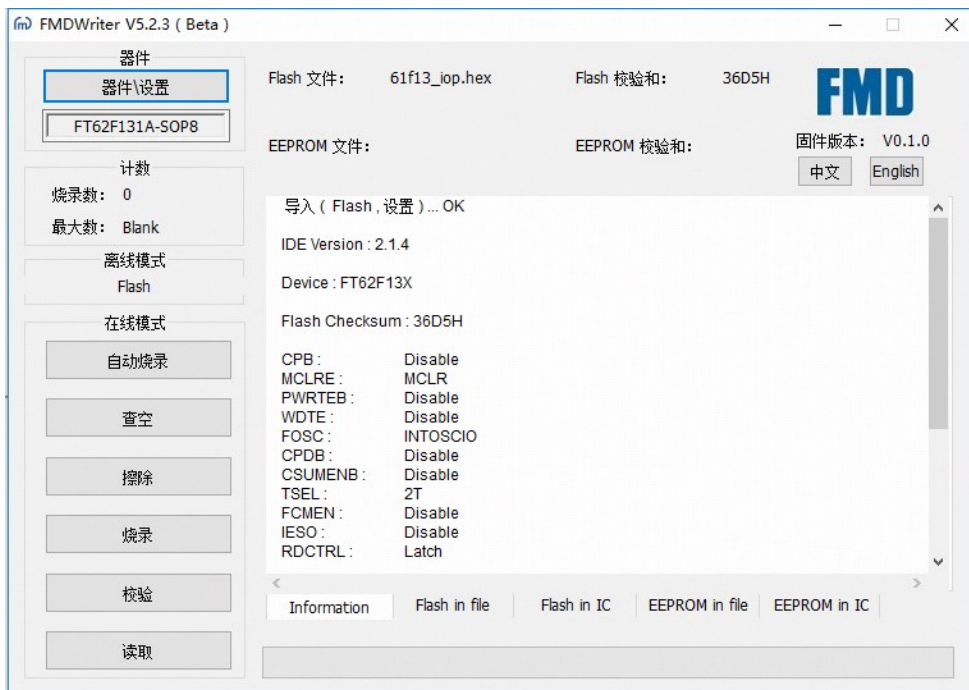
- If selectedEEPROMThe size of the file varies with the device'sEEPROMIf the capacity does not match, a pop-up window will prompt that the file size does not match, and you need to go back to the steps again.①.



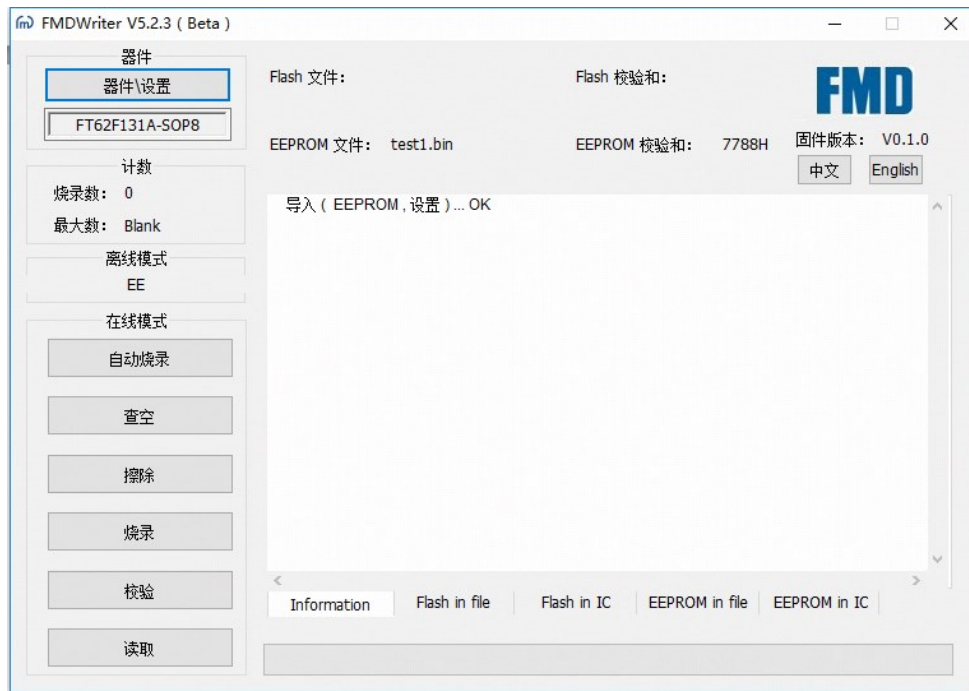
loadedFlashandEEPROMafter the fileFMDWriterinterface, the offline mode prompt isFlash+EE, InformationThe interface shows that the generatedHEXdocumentFMDIDeversion number, device name,Flash Checksum, EEPROM ChecksumandOptionsoptions, as shown in the figure below (the red box is the correspondingChecksum):



loadedFlashafter the fileFMDWriterinterface, the offline mode prompt isFlash,InformationThe interface will display the generatedHEXdocumentFMDIDEversion number, device name,Flash ChecksumandOptionsoption, will not showEEPROM Checksum,As shown below:



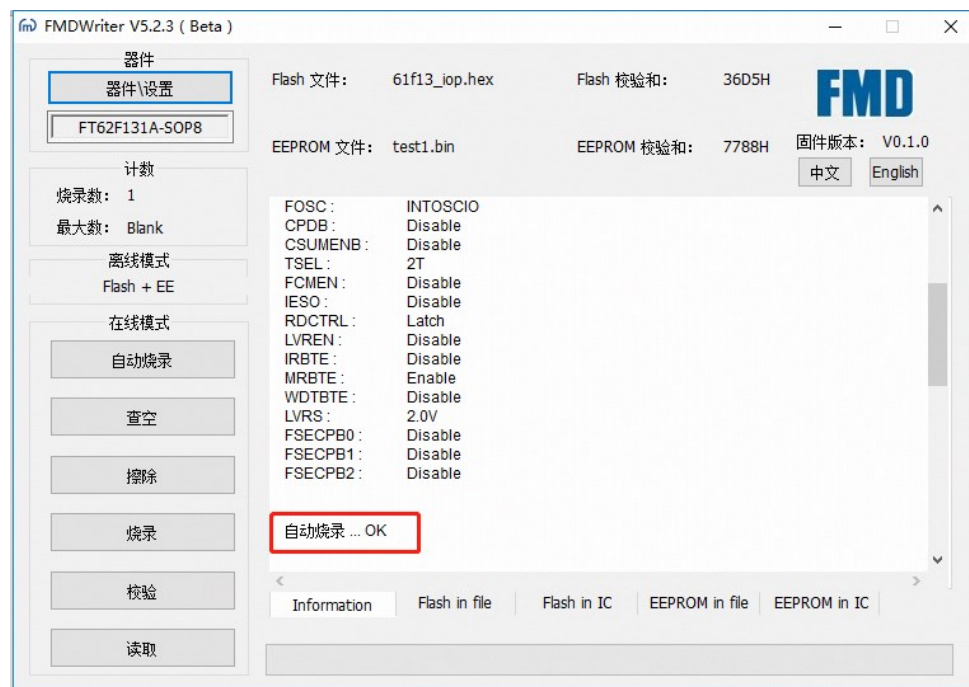
loadedEEPROMafter the fileFMDWriterinterface, the offline mode prompt isEE,InformationThe interface will display the generatedHEXdocumentEEPROM Checksum,As shown below:



- ⑤ After loading the file, you can perform a variety of burning related operations, including automatic burning, blank checking, erasing, burning, checksum reading.

- Automatic burning (Auto Program): Including operations such as erasing, programming, and verifying.

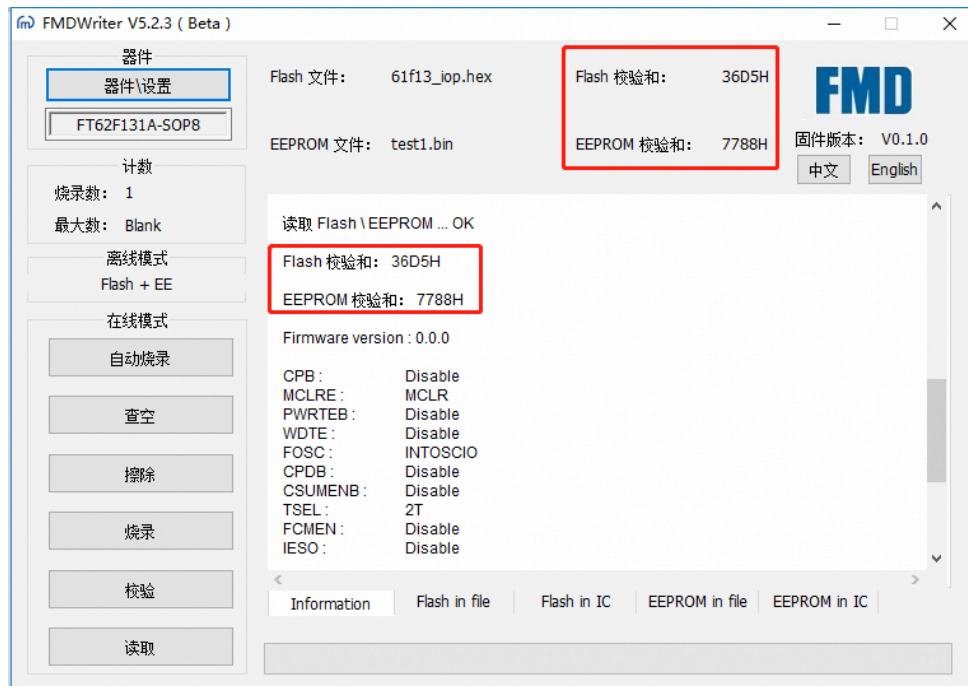
Click the "Auto Burn" button, and the loaded files will operate according to the offline mode settings. After burning successfully, the interface will prompt "Auto Burn...OK", as shown in the figure below, if the burning fails, the interface will prompt "Auto Burn...Fail".



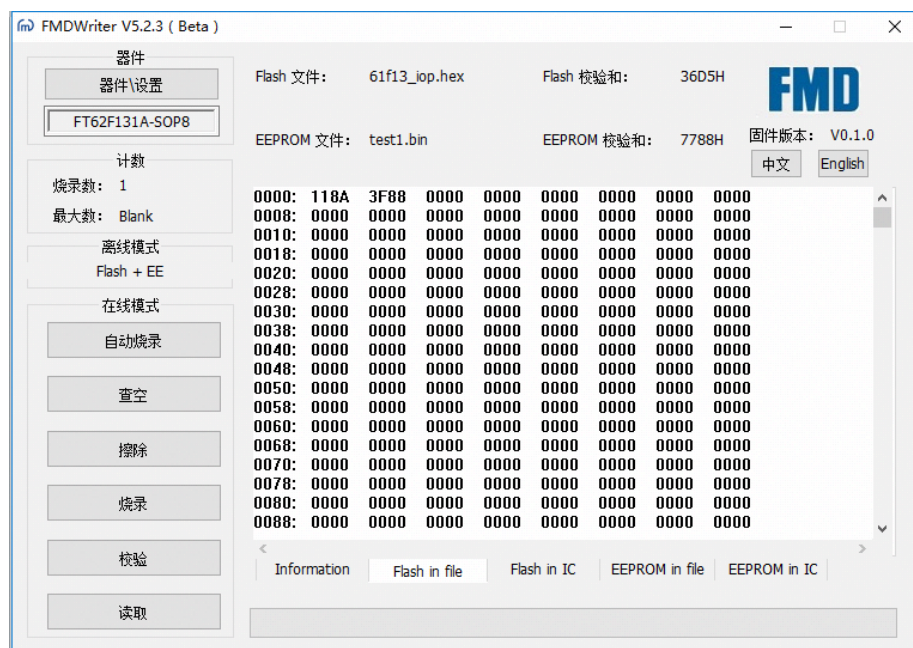
- read(Read): readICofFlashDistrict andEEPROMArea.

Click the "Read" button, after successful reading, the software interface will display the current chipFlash Checksum,

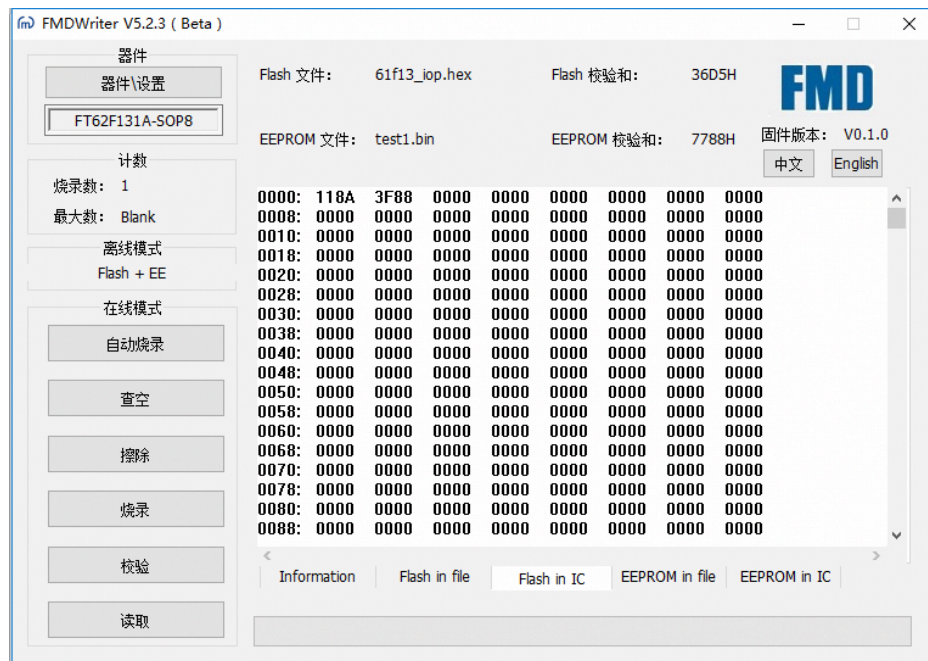
EEPROM Checksum and Options options, readChecksum It is the same as the burned file, as shown in the following figure:



clickFlash in file and Flash in IC tab, you will see Flash file area data and read IC Flash. The area data is the same, and the software interface is as follows:

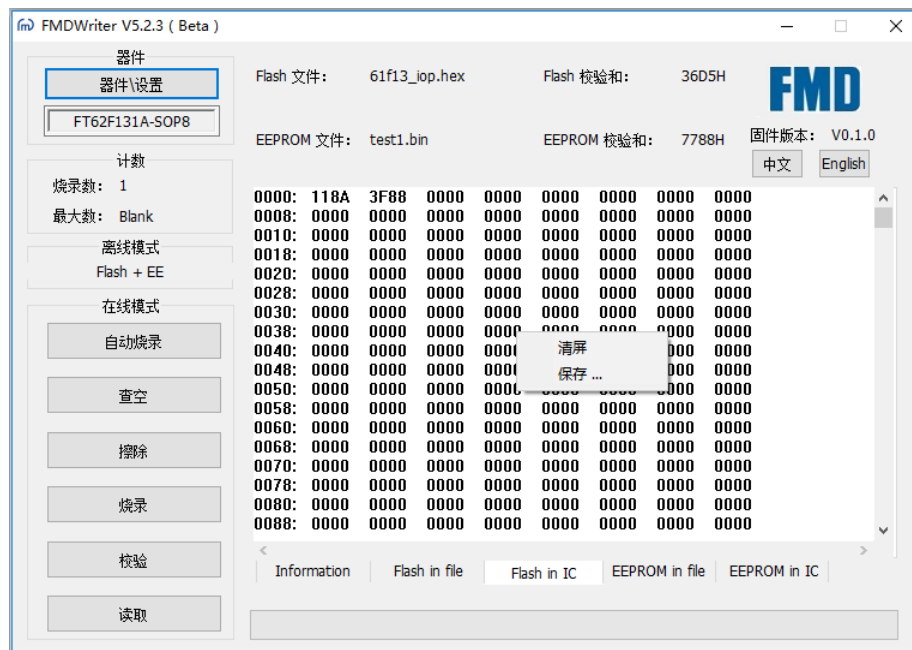


Flash in file

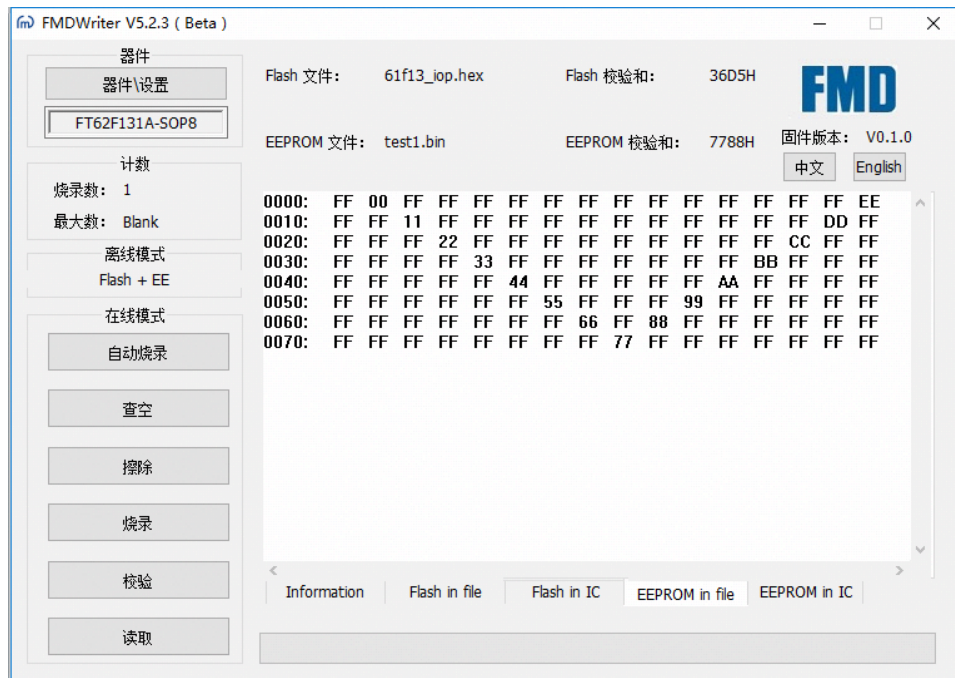


Flash in IC

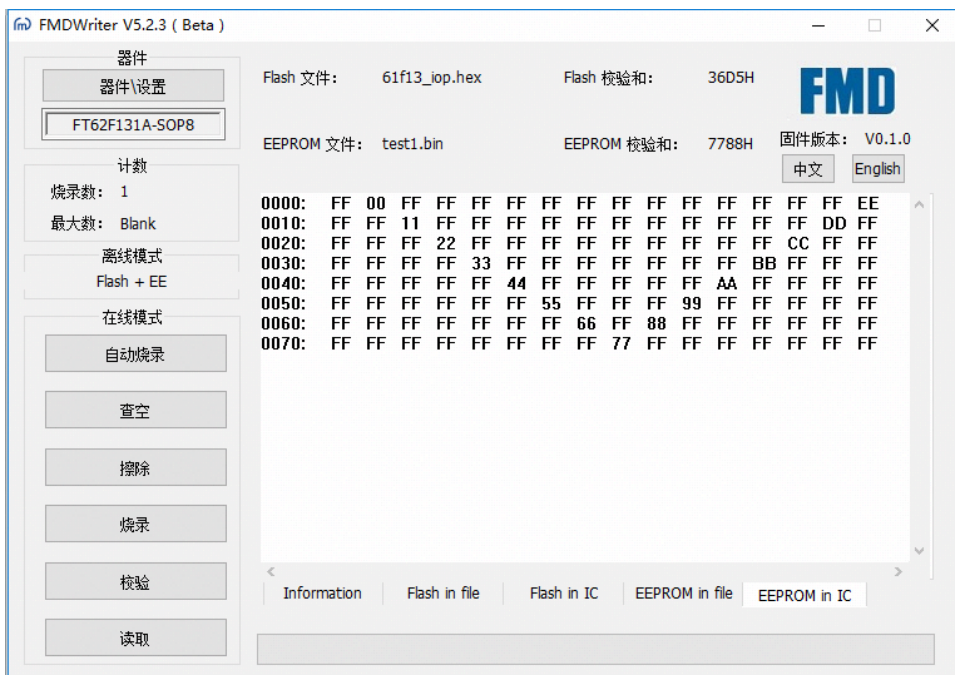
If you need to save the readIC FlashData, right-click to save, as shown below:



click interfaceEEPROM in fileandEEPROM in ICtab, we will seeEEPROMfile area data and readIC EEPROMArea data, the software interface is as follows:



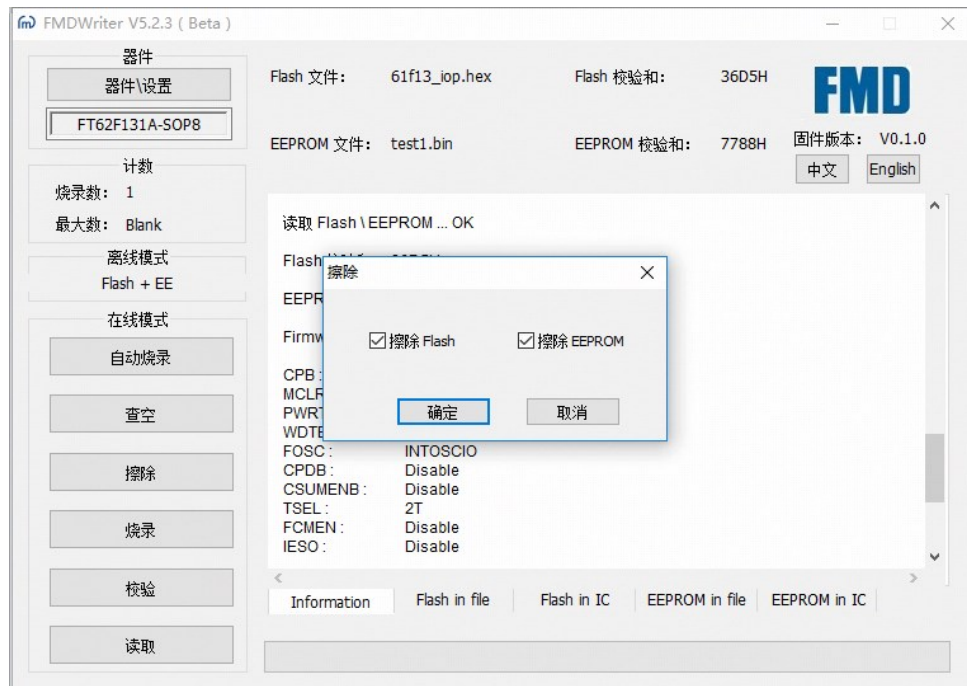
EEPROM in file



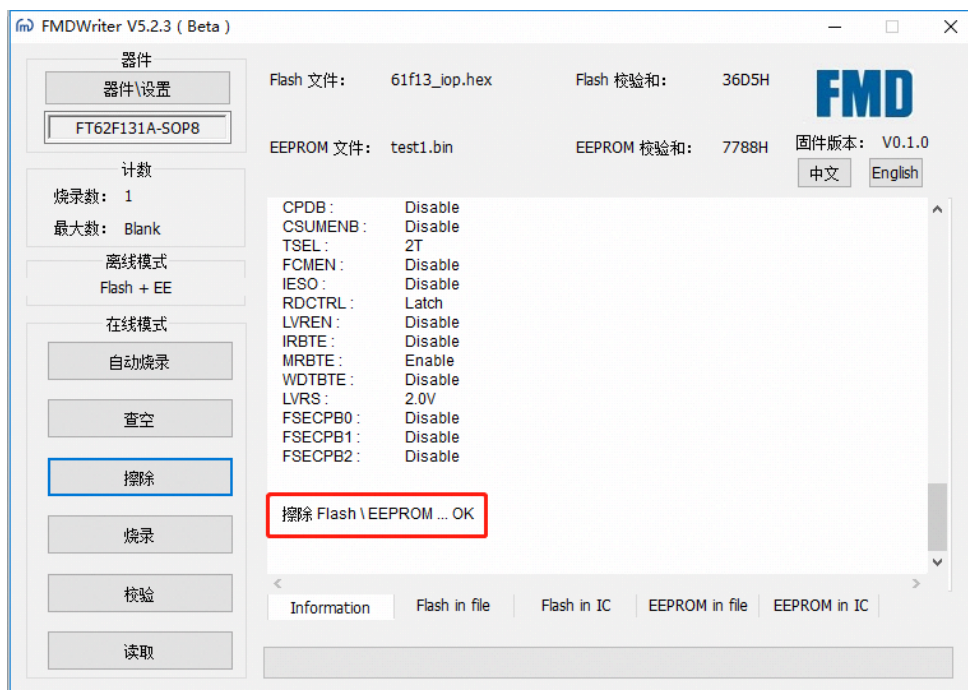
EEPROM in IC

- erase (Erase) : eraseICofFlashor (and)EEPROM.

Click the "Erase" button, and the selection window will pop up as follows:

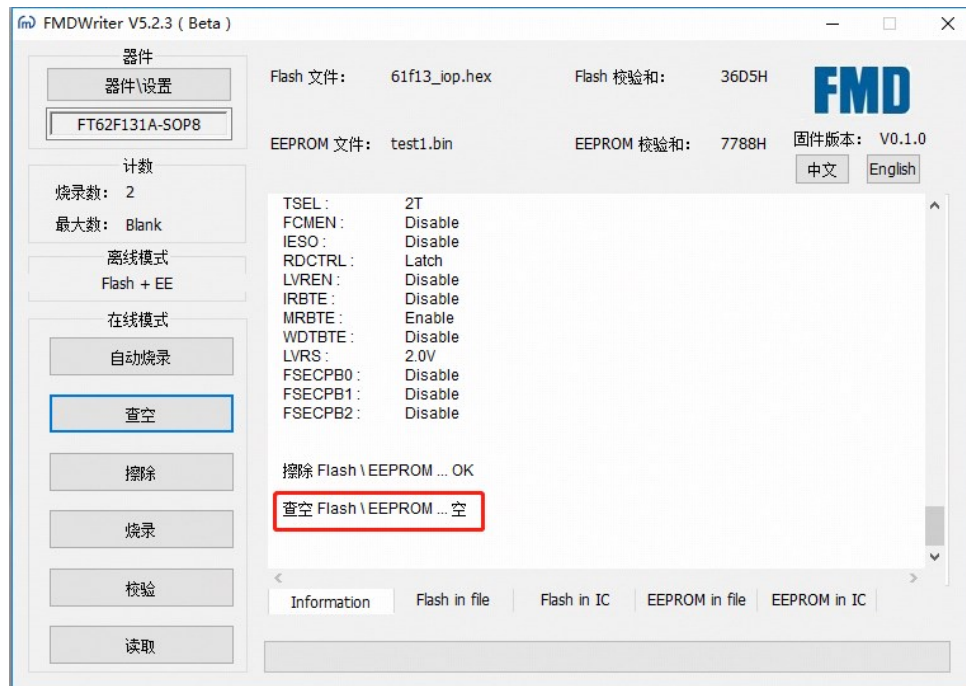


You can choose to erase any or all of them, the erasing is successful, the interface is as follows:

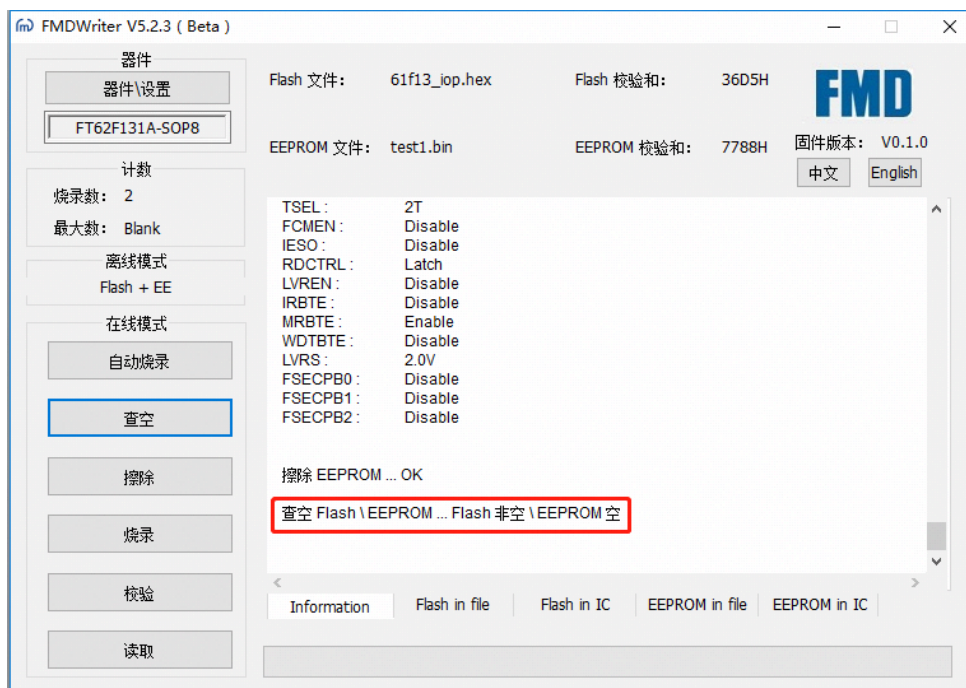


- check empty (Blank Check) : check empty IC Flash District and EEPROM Area.

Click on "Blank" (because the above has been erased Flash and EEPROM), the software interface is as follows:



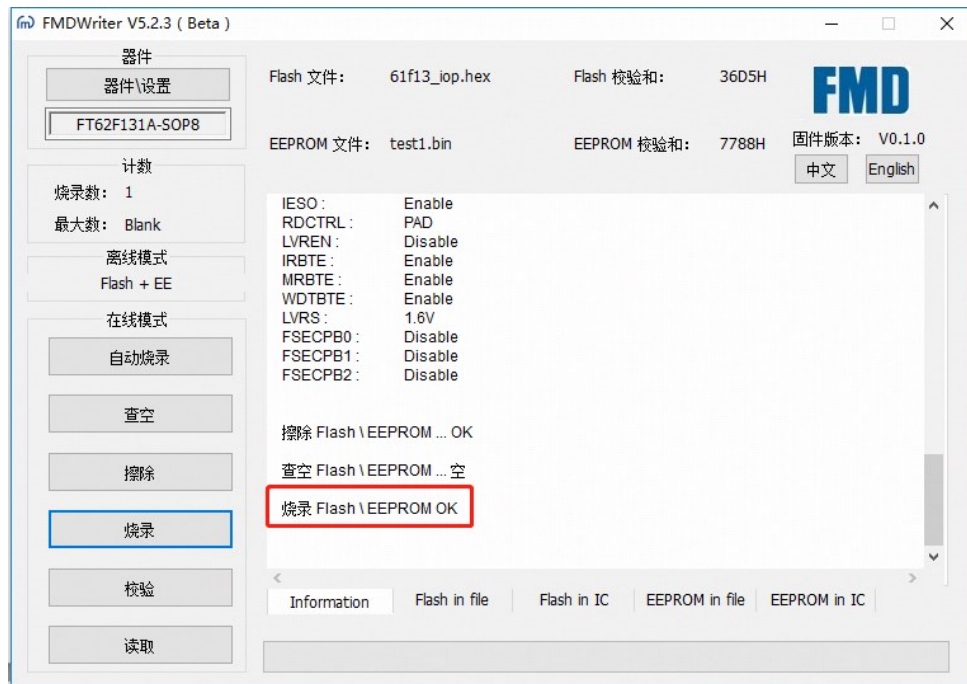
If only erased EEPROM, the empty check result is as follows:



- burn (Program) : right IC Flash and EEPROM area for programming.

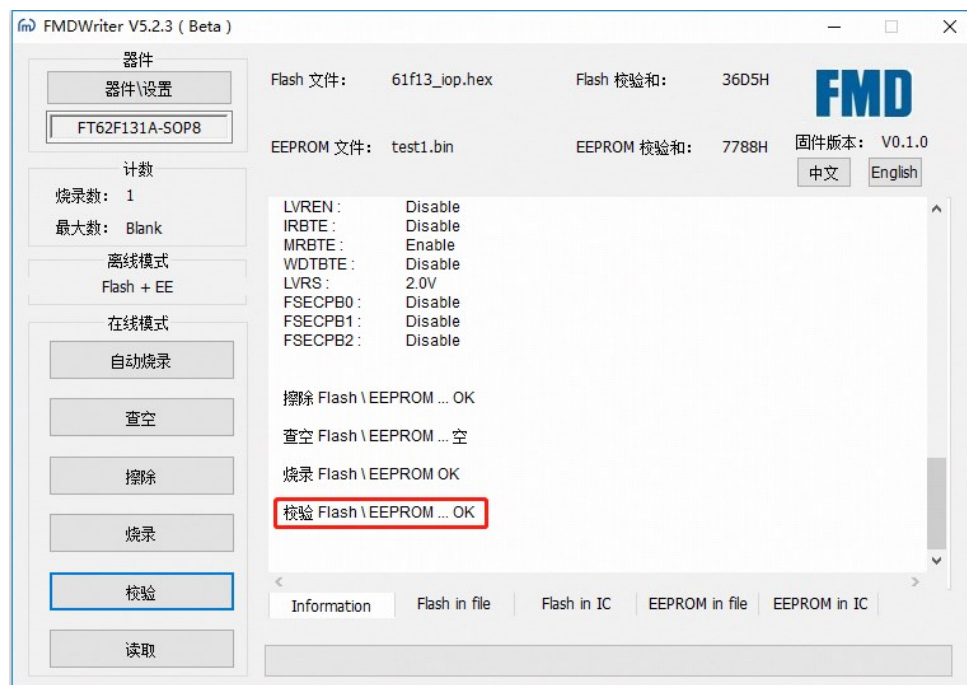
Click "Burn", if loaded Flash and EEPROM file, after the burning is successful, Information The interface will prompt "burning Flash \ EEPROM ... OK", if the burning fails, Information The interface will prompt "burning Flash \ EEPROM ... Fail". If only loaded Flash document, Information The interface will prompt "burning

Flash... OK"or "burnFlash...Fail". If only loadedEEPROMdocument,InformationThe interface will prompt "burningEEPROM...OK"or "burnEEPROM...Fail". The interface is as follows:



- check(Verify):

checkICofFlashDistrict andEEPROMWhether the area is programmed correctly, that is, readICCompare the burned data and the burning files one by one to determine whether they are consistent. The interface is as follows:



3.4 Offline programming steps

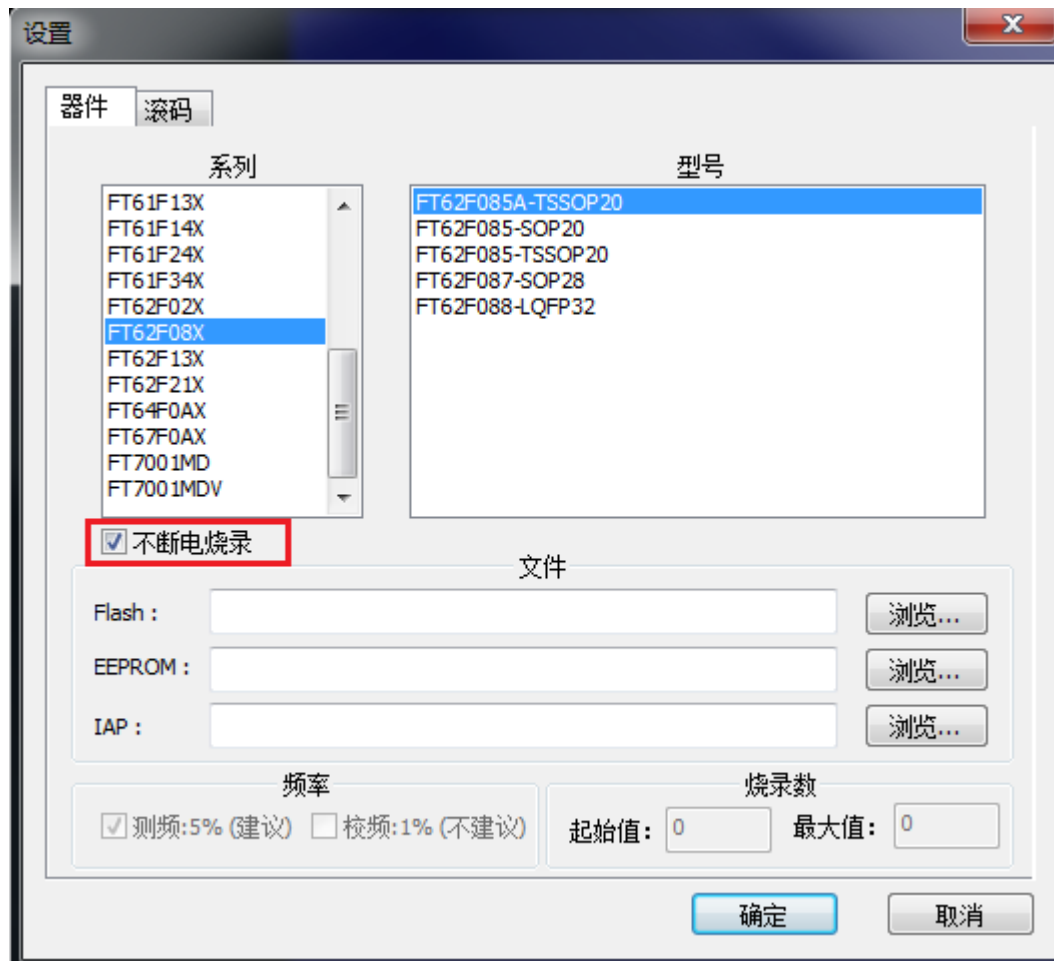
- ① The settings such as selecting the device model and loading files are the same as the online programming operation steps①~④.
- ② loadedFlashand / or)EEPROMfile, at this point just giveUSBpower, you can pressLinkPress the button on the button for automatic burning. During the burning process,LinkThe light above is off, and the green light is on when the programming is successful, and the red light is on when the programming fails.

3.5 Uninterruptible power programming operation steps

Uninterruptible power programming steps(applies toFT60F21X / FT61F13X / FT61F08X / FT62F13X / FT62F08X):

- ① WillFMD Linkpass throughUSBCable to connect to the computer;
- ② When programming with external power supply, it is necessary toFMD LinkInterfaceVMCUandEXVDDshort circuit (see1.2Festival);
- ③ WillFMD Linkthe otherEXVDDThe interface is connected to the power supply of the target board, and theFMD LinkofVDDThe interface is connected to the external reset pin of the chipMCLR;
- ④ OpenFMD Writersoftware, opens the Device/Setup dialog,Check the **uninterruptible power burning option**, as shown in the figure below, you can perform operations such as burning according to the normal process;

Note: the outside of the chipMCLRThe reset function must have been enabled, and the programmedHEXThe file is also enabled MCLR Reset pin to realize continuous power programming;



3.6 Optional function description

3.6.1 rolling code(Rolling Code)

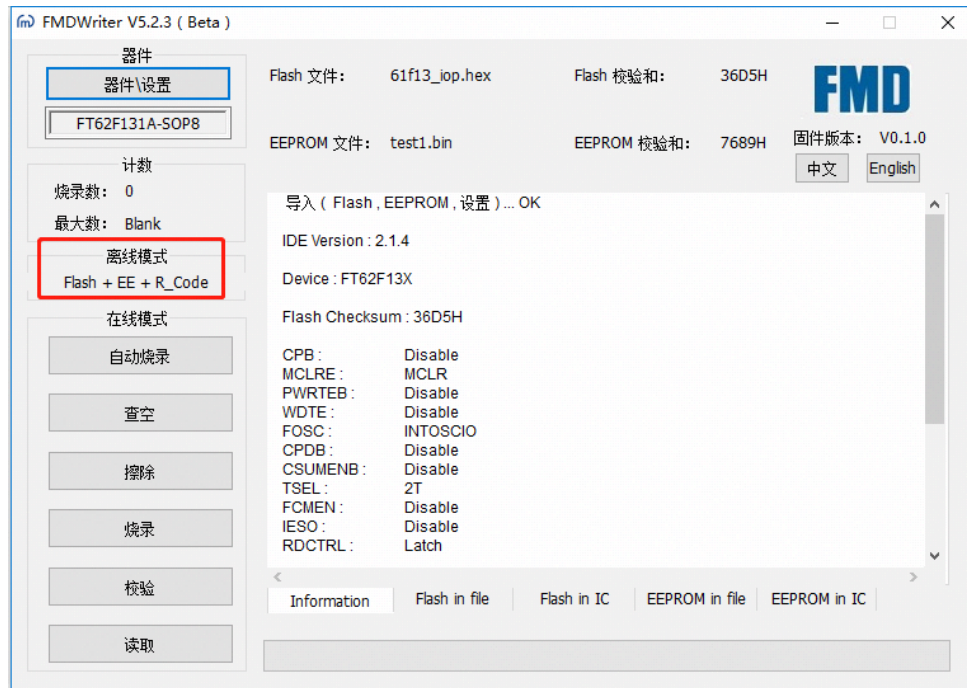
1) Automatic rolling code

Rolling CodeputEEPROMarea, click "Device\Settings" -> "Rolling Code" (add at least one file.hex or .bin), uncheck "Forbid Rolling Code" , the interface pop-up window is as follows:

Parameters include "first address", "Digits", "Start Value", "Accumulated Value" and "End Value" where the "end value" is optional.

- "first address": Start with the address (hexadecimal) of the rolling code, the input range should match the selected device EEPROM capacity;
- "bits": can be set to 1~8 bytes (decimal) ;
- "starting value": The initial value of the rolling code (hexadecimal), the longest is not more than the set number of digits.
- "cumulative value": Incremental value (decimal) after each successful programming, which can be set to 1~255.
- "end value" : The initial value of the rolling code (hexadecimal), optional, can be set by unchecking "Disable end value".

After setting the relevant parameters correctly according to the requirements, click OK. Flash and EEPROM Two kinds of files, the prompt message for offline mode becomes Flash + EE + R_Code, Express Rolling code. The setting is successful, as shown in the red box in the following figure:



For example: set the first address as 0x7F, the number of digits is 1, the starting value is 00, the accumulated value is 01, you can read after the first programming. EEPROM district 0x7F address is 0x00, the second programming will automatically increment to 0x01, the third time is 0x02, increasing to 0xFF. After that, it will be restarted from 0x00. Start.

If the end value is set, when rolling code. When the set maximum value is reached, it will not be able to continue programming. Link. The red light will be on to report an error, at this time it needs to be reset by the host computer. Rolling code, you can program again.

2) Manual rolling code

In the rolling code setting interface, there is also a manual write rolling code (Rolling code) mode, as shown in the figure:



Click to set, you can manually input the parameters to be set, parameters include "start address","Fixed value","change value", Bits, Data Format, and Rules.

- "data format": optional 16base and 10base, after selection, the "start address", "Fixed value" and "Variation value" need to be input according to the data format checked in "Data format".
- "Rule": You can check whether to accumulate or not. If you don't check it, the rolling code will remain unchanged, and the rolling code will be the same value for each programming.
- "Start address": the address to be replaced with the rolling code at the beginning, the input range should match the selected device's EEPROM capacity.
- "Fixed value": The initial value of the high bit of the rolling code, the optional number of digits is 0~7, the high-order value remains unchanged during the process of burning the rolling code. If you do not need to fix the high-order value, you can select the number of digits as 0.
- "change value": The initial value of the low digit of the rolling code, the optional digits are 0~7, if the accumulation is checked, the change value will be automatically added after each programming.

The manual rolling code interface is as follows. After setting the parameters, "Write data" shows the rolling code value to be burned, click to run:

After running, "Read Back Data" shows the written rolling code value, "Write data" shows the rolling code to be burned next time value, the interface is as follows:

手动写 Rolling Code

数据格式: ☒ 16进制 ☐ 10进制

规则: ☒ 累加

起始地址: 7E (HEX: 00 ~ FF)

固定值: 00 (HEX: 00 ~ FF) 位数: 1

变化值: 02 (HEX: 00 ~ FF) 位数: 1

写入数据: 0002 (HEX)

读回数据: 0001 (HEX)

Run

read the burnedEEPROMThe status is as follows:

FMDWriter V5.2.3 (Beta)

器件: 器件设置 FT62F131A-SOP8

计数: 烧录数: 1 最大数: Blank

离线模式: EE + R_Code

在线模式: 自动烧录 查空 擦除 烧录 校验 读取

Flash 文件: test1.bin Flash 校验和: 758BH

EEPROM 文件: test1.bin EEPROM 校验和: 758BH 固件版本: V0.1.0

0000: FF 00 FF FF FF FF FF FF FF FF FF FF FF FF EE
 0010: FF FF 11 FF FF FF FF FF FF FF FF FF FF FF DD FF
 0020: FF FF FF 22 FF FF FF FF FF FF FF FF FF FF CC FF FF
 0030: FF FF FF FF 33 FF FF FF FF FF FF FF FF BB FF FF FF
 0040: FF FF FF FF 44 FF FF FF FF FF FF FF AA FF FF FF FF
 0050: FF FF FF FF FF FF 55 FF FF FF 99 FF FF FF FF FF
 0060: FF FF FF FF FF FF 66 FF 88 FF FF FF FF FF FF FF
 0070: FF FF FF FF FF FF 77 FF FF FF FF FF FF FF 00 01

Information Flash in file Flash in IC EEPROM in file EEPROM in IC

3) Power down rolling code

Whether it is automatic rolling code or manual rolling code, power-off saving is supported, that is, when FMD-Link the power is turned on again, the rolling code will not be restored to the initial setting value, but the rolling code value after the last programming will be saved.

3.6.2 School frequency(Calibrate frequency)

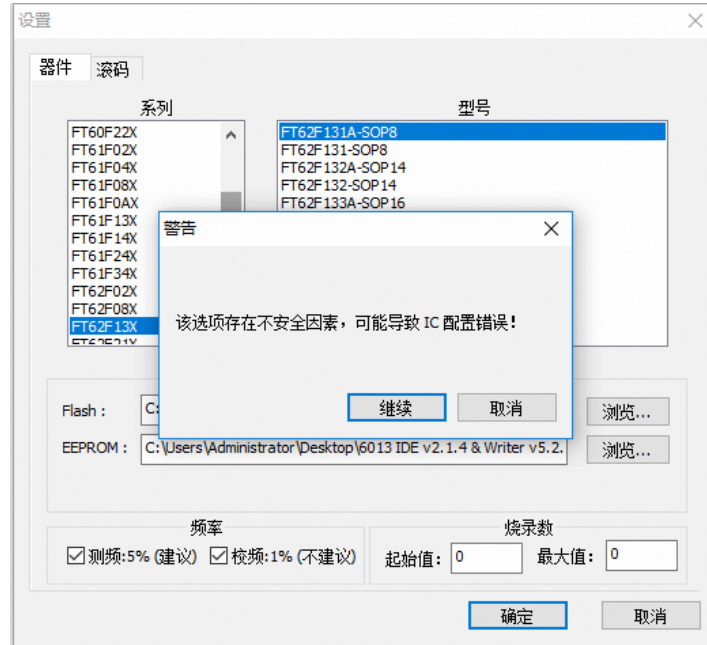
FMD-Link provided MCU Internal high speed RCThe frequency test and calibration function of the oscillator, when selecting the load file, the frequency measurement (accuracy) is checked by default.5%), you can also check the check box in front of the calibration frequency, select "Calibration", a warning window will pop up,

As shown in the figure:

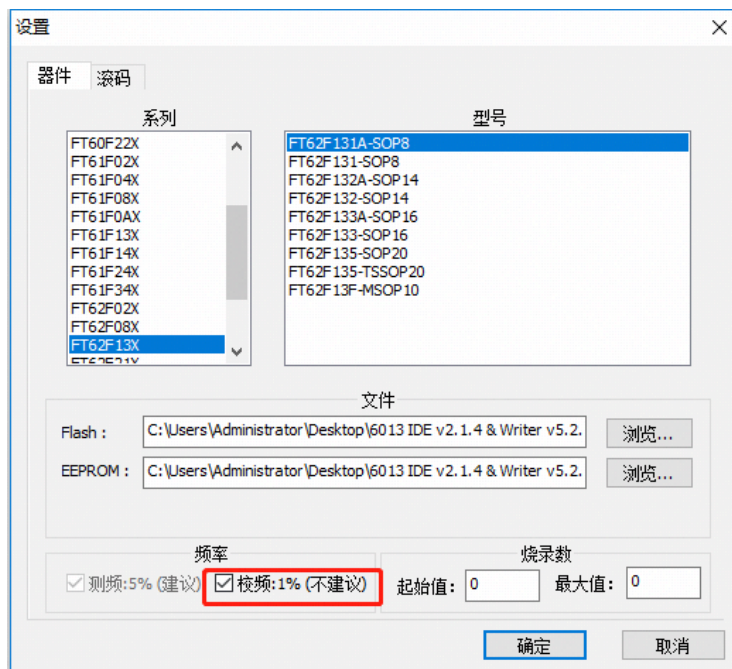
Notice1: This function has high risks and is not recommended to use. Please consult before using this function;

Notice2: When the frequency calibration is selected, the frequency is measured first and then the frequency is calibrated by default, so the check box in front of the frequency measurement can be optional or not

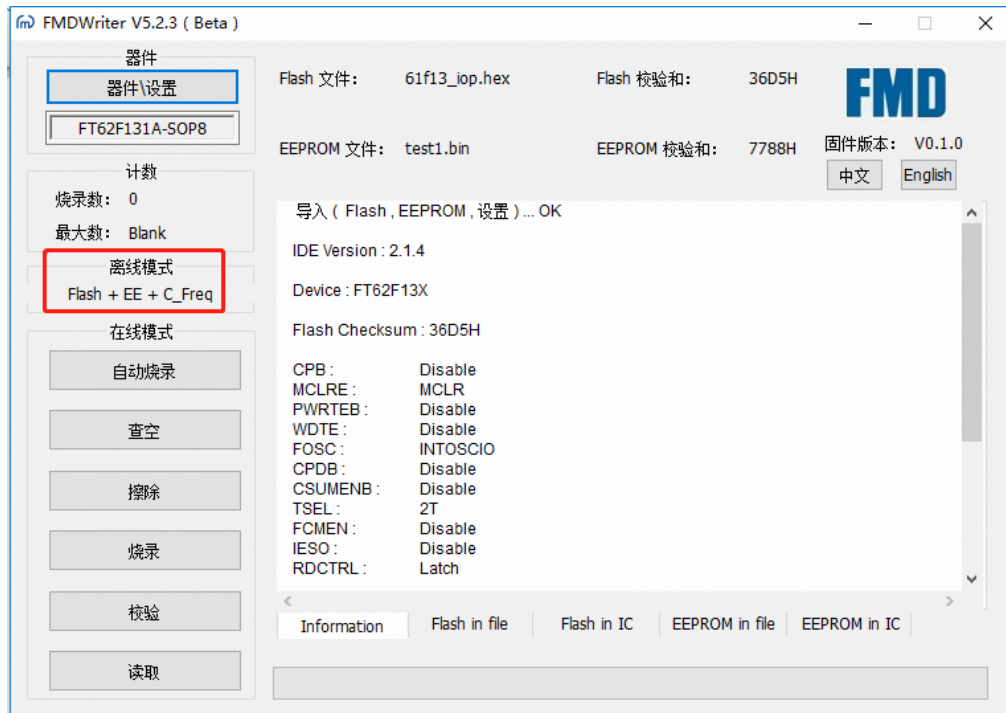
selected, which does not affect the frequency calibration;



Click Continue, you can see that "Schedule Frequency" has been selected, as shown in the figure:

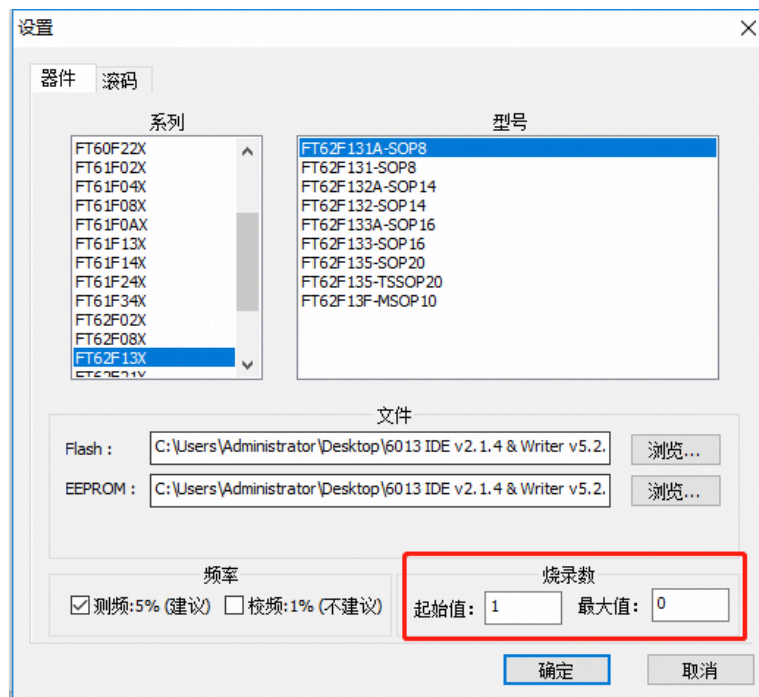


Click OK, the offline mode prompt message changes to Flash + EE + CAL_Freq, indicating that the frequency calibration function is successfully set, as shown in the following figure:

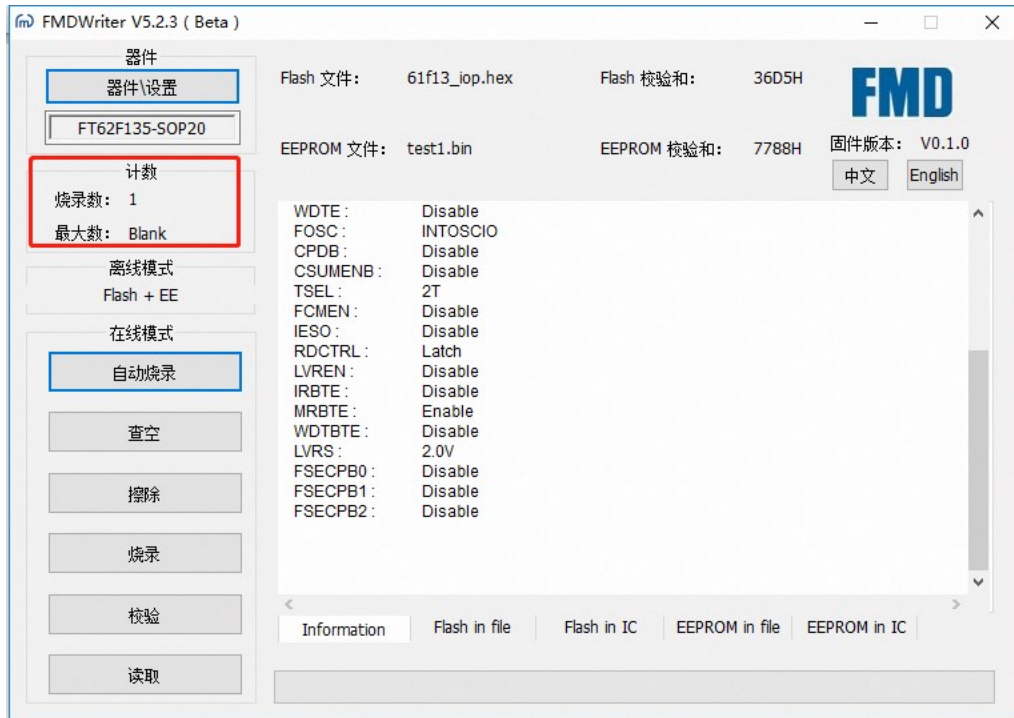


3.6.3 Number of burns(Counter)

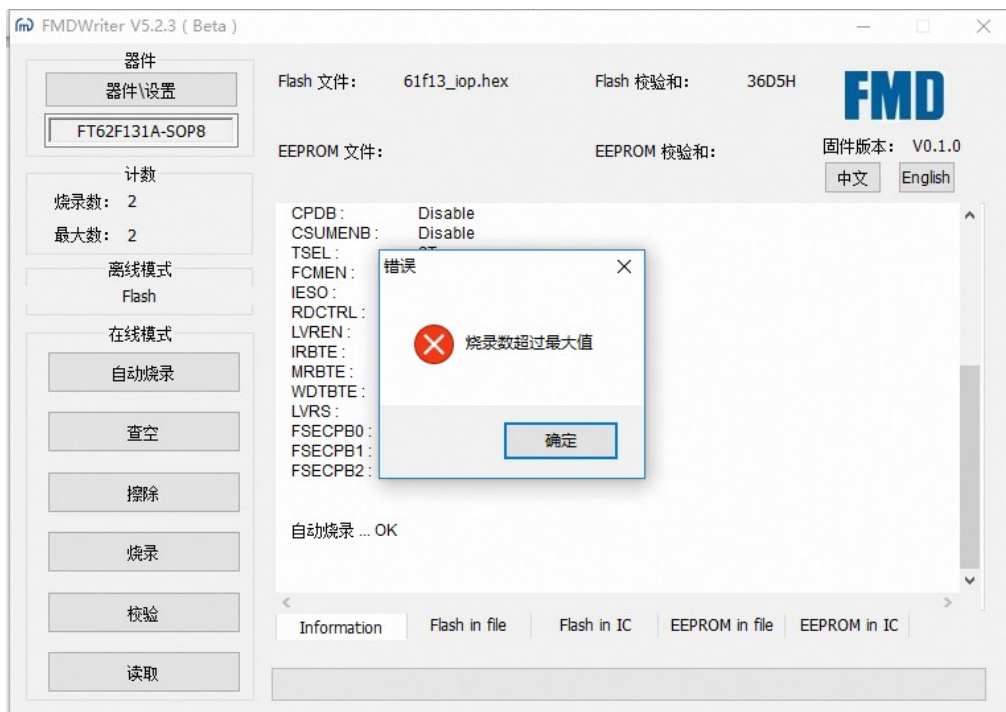
In the "Device/Settings" interface, you can set the initial and maximum values of the counter, as shown in the following figure:



Click OK, you can see the number of programming and the maximum number in the "Count" section of the main interface. The number of programming is displayed as the set initial value. When the maximum value (MAX Value) is set as 0, it means that there is no limit to the number of programming, and the maximum number is displayed as Blank. As shown below:



The programming is successful once, and the number of programming increases 1, if the maximum number is set to a limited value, after reaching the maximum set value, FMD-Link No longer respond to any burning commands. For online programming, FMDWriter An error window will pop up indicating that the number of burns exceeds the maximum value, as shown in the figure below. For offline programming, LinkRed light to report an error. At this time, it is necessary to connect the host computer to update the programming number before continuing programming.



3.7Connecting Machine Instructions

- **3.3V:**Pick-up deskVDDInput port, only selectable3.3V!
- **Start:**Start programming signal, low level is valid, before each programming, the programming machine only readsFMD-Link ofBusysignal, ifBusysignal is high, indicatingFMD-LinkWhen idle, you can generate a recording command, and the recording machine gives a low pulse signal,FMD-Linkstart programming;
- **Busy:** In the process of programming, low level is active, indicating thatFMD-LinkBusy operation and need to waitBusy The signal can only be sent after it goes highStartSignal;
- **OK:**The programming success signal, low level is valid, if the programming is correct, thenOKThe signal is low level;
- **NG:**Programming failure signal, low level is valid, if programming fails, thenNGThe signal is low level;
- **GND:**Pick-up deskVSS;

All logic signals are3.3VlevelIOInput and output, with limited load capacity, if you use a strong load, please connect an external load circuit.

Appendix Version Change History

Version	date	content
V 0.1	2020/04/28	first edition