# iMQ Flash Writer User Manual
# V3.4

# Table of contents

# 1. Modification record

| Version | Approved Date | Description |
|---|---|---|
| V3.4 | 2023/10/11 | 1. English version of Chinese User Manual v3.4. |
| V1.0 | 2020/08/12 | English Version 1st issue.<br>Add note to "Switch" function. |

# 2. Overview of System Functions

iMQ Programmer Flash Writer is developed by iMQ Technology Inc. Flash Writer can support both On-Line mode (connect to PC) and Off-Line mode (disconnect to PC). Flash Writer can support programming to MQ series and SQ series products.

Note: The previous version Writer 300 only supports programming of MQ series products.

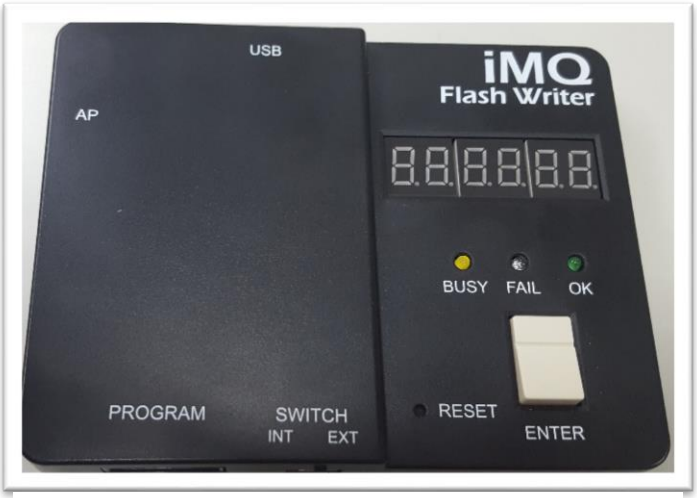



Figure 2-1 Flash Writer

In On-Line mode, the Flash Writer has to connect with PC by USB cable, user can execute the programming process by the software GUI interface. In Off-Line mode, the Flash Writer has to pre-download programming contents and settings from PC. Only complete the pre-download, the Off-Line mode programming would be active.

The functions of iMQ Flash Writer mainly include:

(1) Program the content of .h16 file compiled by the IDE into the Program Memory of MCU, and read-out the data to verify.
(2) The data which is programmed to the memory of MCU. The data can read out to the GUI of Flash Writer and save to output file on PC. User can also set protection to programmed data.
(3) Provides a stable rolling code programming function that is not affected by power failure or reset.
(4) Flash Writer also provides "On-Line mode" and "Off-Line mode" programming.
(5) It has a power source switch, you can choose internal or external power supply for programming. To no longer limited drive capability, you can choose external 3.3V~5.5V.
(6) Measurement pin is easier for problem solving.
(7) Flash Writer has AP (automatic programming) machine prevents noise design; separates the AP machine and Writer signals to avoid interference .
(8) Compact in size and stable in programming.

# 3. Package Content

(1) Outer Box x 1
(2) Flash Writer (include PCBA) x1
(3) Software/firmware x1
(please contact : fae@imqtech.com)
(4) USB cable x1

# 4. Introduction to Flash Writer

## 4.1 Hardware introduction

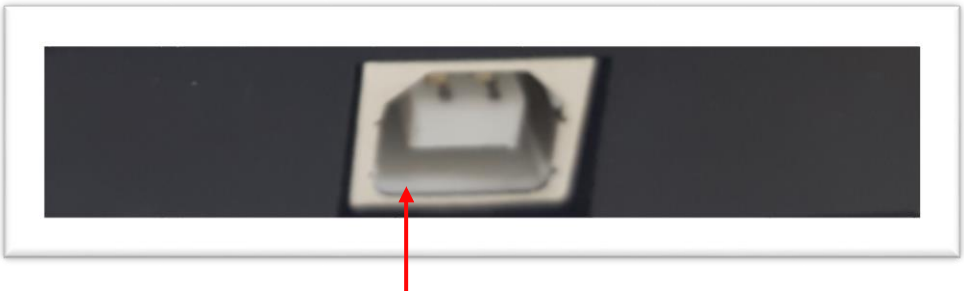
The appearance of the Flash Writer is shown as follows:


Figure 4-1 Flash Writer Top View


Figure 4-2 Flash Writer Side View (1)

(G) AP Port

Figure 4-3 Flash Writer Side View (2)



(H)USB Port

Figure 4-4 Flash Writer Side View (3)

Flash Writer configurations are as below:

| No. | Name | Description |
|---|---|---|
| (A) | LED display | Display the information as software/firmware version, IC type, checksum, error code... etc. |
| (B) | LED | Green LED, the status is "OK", Yellow LED, the status is "Busy" ,Red LED, the status is "Fail" |
| (C) | ENTER | Use in " Off-Line programming", push ENTER to program |
| (D) | RESET | Restart Flash Writer |
| (E) | Program port | The bottom row of program port is used to programming. The upper row is used to measurement. |
| (F) | Switch | Switch the power source.<br>INT: internal power (3.3V).<br>EXT: external power (3.3V~5.5V)<br>Before power on, please confirm the state of switch.<br>Before switch the internal/external power, please turn off the power (remove the USB power cable). When power switch is set finish, then power on. |
| (G) | AP port | AP port is connected to auto programmer.VSS is for internal power. When AP is power supplied by external power, use "GND." |
| (H) | USB port | Connect to USB cable. Flash writer is power supplied by USB (5V). User can connect to PC/NB USB port or USB adapter for power supply. |

PROGRAM port: use the bottom row I/O pins for programming, the upper row I/O pins for measurement.

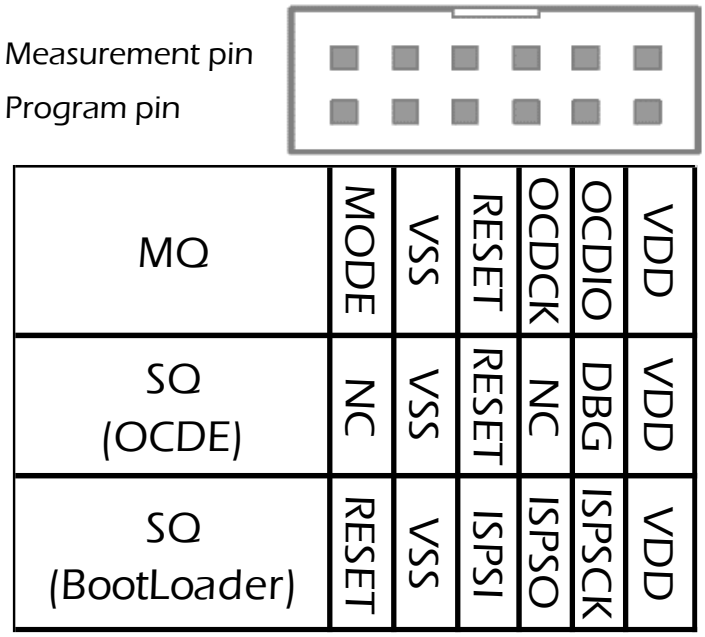



Figure 4-5 PROGRAM port

AP port: AP port is connected to auto programmer machine. VSS is for internal power. When AP is power supplied by external power, use "GND". Default is VSS.

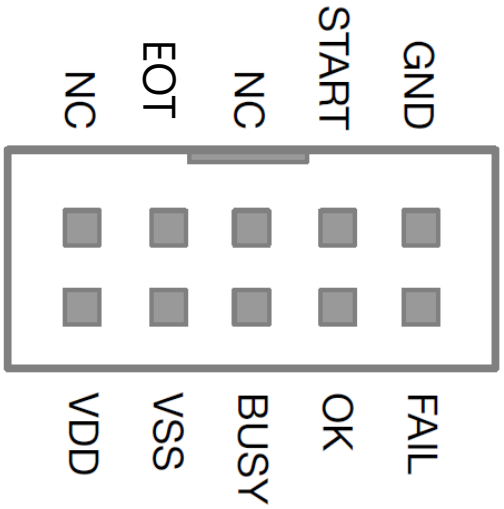



Figure 4-6 AP Port

## 4.2 Message of LED display

The 7-segment LED display can show information such as software version, IC model, check code, operating procedure, rolling code and error code.

When Flash Writer is power on or reset, it will display following message in sequence:

(1) Current software version: For example, if the software/firmware version is V1.10, "v_1.10" will be displayed, as shown in Figure 4-7.

Figure 4-7 Version display

*Note:* The software/firmware release date code "d._1119" would be displayed. (This message is shown in V1.10 or later version.)

Figure 4-8 Date display

(2) IC Type: If the software/firmware version is V1.10 or later, IC Type Number (as product MQ6832 for example) "6832" will be displayed, as shown in Figure 4-9.

Figure 4-9 IC Type

(3)Operating procedures: There are 6 procedures, include Erase/Blank Check/Write /Verify/Rolling Code/Protect, which are set according to the computer GUI selection and then downloaded to the writer. The codes of the different procedures are as follows:

| Operating Procedures | code |
|---|---|
| Erase | E. |
| Blank Check | b |
| Write | P |
| Verify | v |
| Rolling Code | r |
| Protect | L |

For example, if the operation procedures are Erase/Blank Check/Write/Verify /Rolling Code/Protect, "EbPvrL" will be displayed as shown in Figure 4-10. If the operation condition is not selected, the English letter will be represented by a bottom line "_".

Figure 4-10

(4) Checksum: LED can display the last 6 digits of the checksum. For example, if the checksum of code on Flash Writer is "0x03b726", it will display "03b726", as shown in Figure 4-11.

Figure 4-11

(5) Rolling Code: If Flash Writer has programmed the rolling code, it will display the rolling code of each IC for checking. For example: if the rolling code is 0001, "r_0001" will be displayed.

Note : In order to avoid misunderstanding, LED display shows below letters with a dot. Display letter "b" as "b." ; letter "C" as "C."; letter "d" as "d."; letter "S" as "S.", letter "r" as "r.", and Letter "L" as "L."

In normal condition, the user pressed the Enter key and program result is success, 7-

sgment display **Checksum**. If it is set to program rolling code, it will also display the **Rolling Code** after procedure. If there is any error happened, the 7-segment display will show an **Error Code**.

The Error Code, definition and description table are as follows:

| Error Code | Description |
|---|---|
| Err_1 | **Writer Test Fail.**<br>Writer basic detection is fail. |
| Err_2 | **Test Mode Fail**<br>Unable to enter Test Mode. The possible reasons are: the IC is not placed properly, the transfer board is incorrect, the packaging is bad(open short issue), the IC version is incorrect, or no IC detected.....etc. |
| Err_3 | **Blank Check Fail.**<br>1. This message means that the target programming IC is not blank.<br>2. If the target IC is an IC that has already been programmed (the "Only Program User Data" setting option on the option page is checked), this message means that the target IC is empty and no program has been programmed. |
| Err_4 | **Verify Fail.**<br>When writer execute read back comparison, the data programmed into the MCU code area or data block (Info Block) are not match with the download contents stored in Flash Writer. The IC may have been programmed, or a programming error occurred. |
| Err_5 | **Rolling Code Fail**<br>Rolling code writing failed. It may be because multiple programming is used, the Rolling Code is only allowed to be written during the first programming. The error code will appear when the Rolling Code is programmed for the second time or more. |
| Err_6 | **Trim Code Error.**<br>This error code will appear when the Trim code is different from the FT post. |
| Err_7 | **OCD Password Error**<br>When the SQ series products use the OCD interface, the input password does not match the OCD password that has been set in the IC, this error code will appear. |
| Err_9 | **Boot Loader Password Error**<br>When the SQ series products use the Boot Loader interface, the password entered does not match the Boot Loader password that has been set in the IC, this error code will appear. |
| Err_9 | **Write Info. Block Error**<br>To write Info Block of MQ series products, the comparison with the original data fails. |
| Err_A | **Pin Count Error**<br>The pin count of the IC does not match the setting of the programming file. |

| | |
|---|---|
| Err_B | **H16 Verify Fail.**<br>The data programmed into the MCU program code area is wrong while read-back comparison. |
| Err_C | **CP Version Error.**<br>The CP test version of the IC is wrong. |
| Err_D | **Erase Error.**<br>An error occurred while erasing this IC. |
| Err_E | **Failed Die.**<br>This IC failed the CP test. |
| Err_10 | **Set Boot Loader Password Error**<br>If the SQ series products use the Boot Loader interface, Boot Loader password cannot set normally. This error code occurs. |

Note: Err_F is currently reserved and undefined.

In addition, the other display codes of 7-segment LED display are as follows:

| display code | Description |
|---|---|
| r_End | **Rolling Code End**<br>When the times of rolling code meet the maximum value, the following program will not continue.<br>"**r_End**" is a hint message to user, it is not an error. |

## 4.3 Software installation

Click setup file(such as iMQ_Writer_setup.exe) to install the software of iMQ Writer. Install the software step by step (as figure 4-12~4-14), the default destination location is "C:\iMQ\iMQ Writer".

Step 1: Set the software installation path

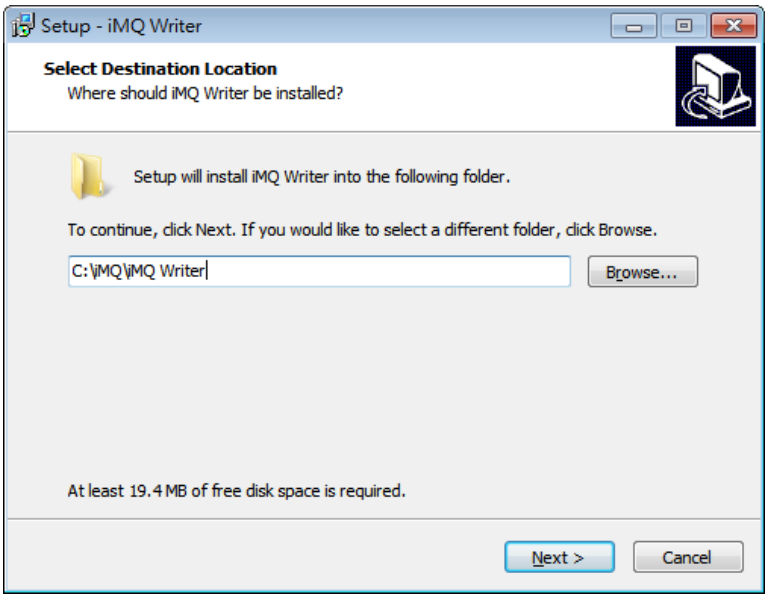



Figure 4-12

Step 2: Choose whether to create a shortcut on the desktop

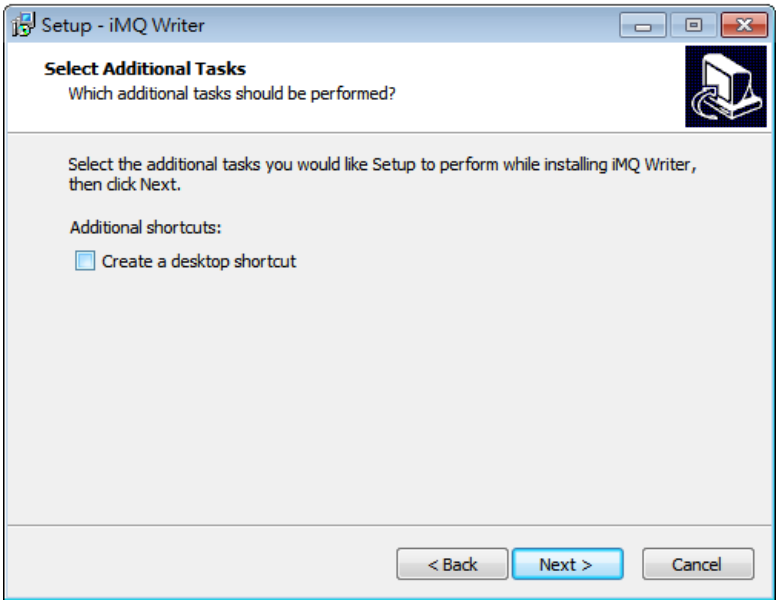



Figure 4-13

Step 3: The message of completing the installation. User "Launch iMQ Writer" option is checked, and click "Finish" button. It will execute the main page of Flash Writer software.

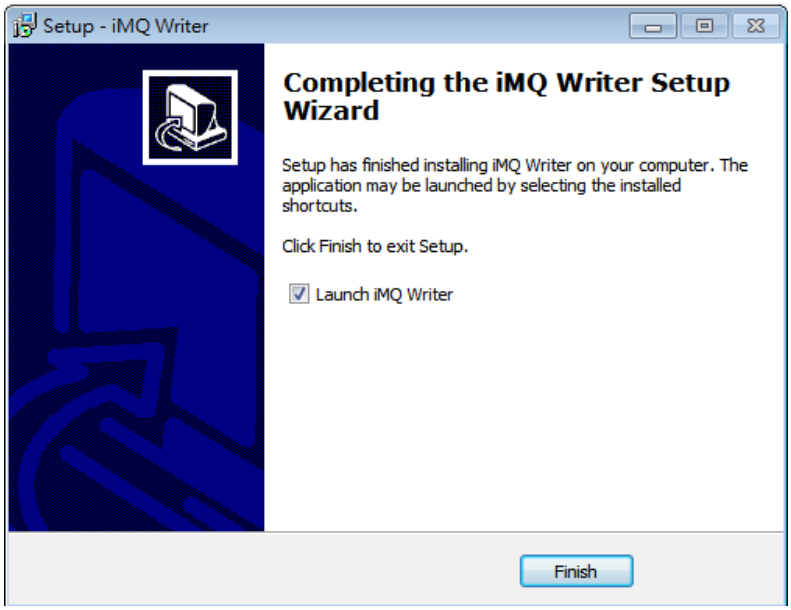



Figure 4-14

## 4.4 Driver installation

If the software is installed, but the writer cannot be detected after being connected to the PC computer, please click to enter the "drivers" folder in the installation directory, and click to execute "USBXpressInstaller.exe" to install the USB driver, as shown in Figure 4 -15 and Figure 4-16.

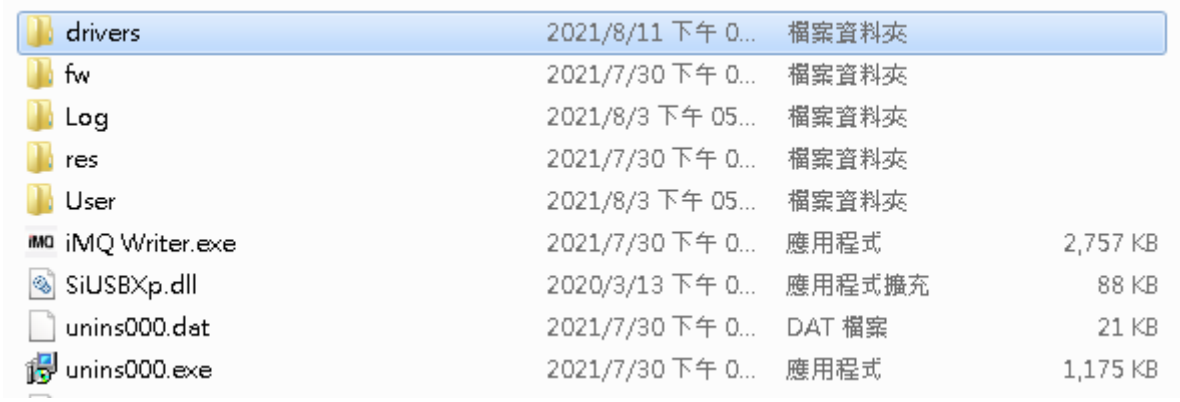



Figure 4-15

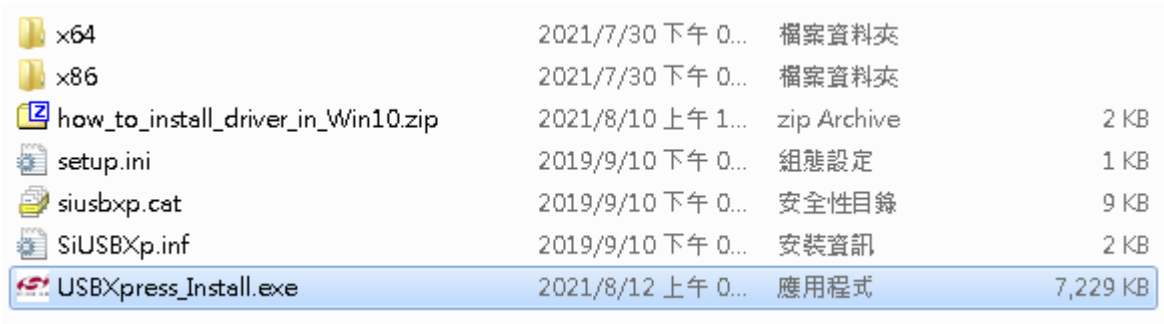



Figure 4-16

When the computer OS is Windows 10, click to execute "USBXpress_Installer.exe " to install the USB driver . If a warning window appears, as shown in Figure 4-17.

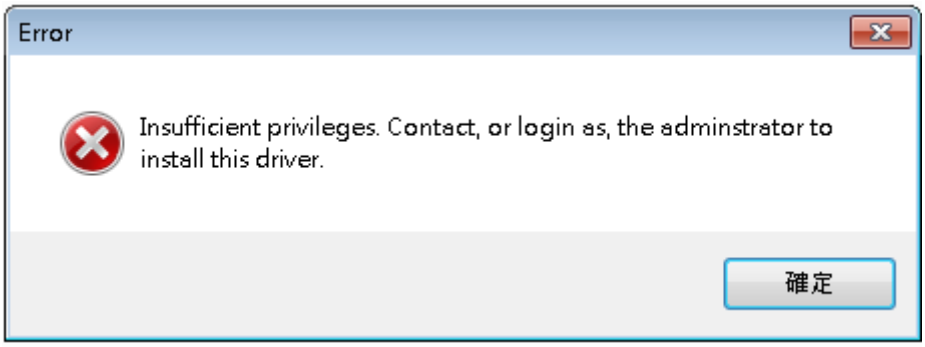



Figure 4-17

In this condition, please uncompressed the file " how_to_install_driver_in_Win10.zip " in the same folder , and refer to the steps in " readme.txt " to execute them step by step as the account right of the administrator, as shown in Figure 4-18.

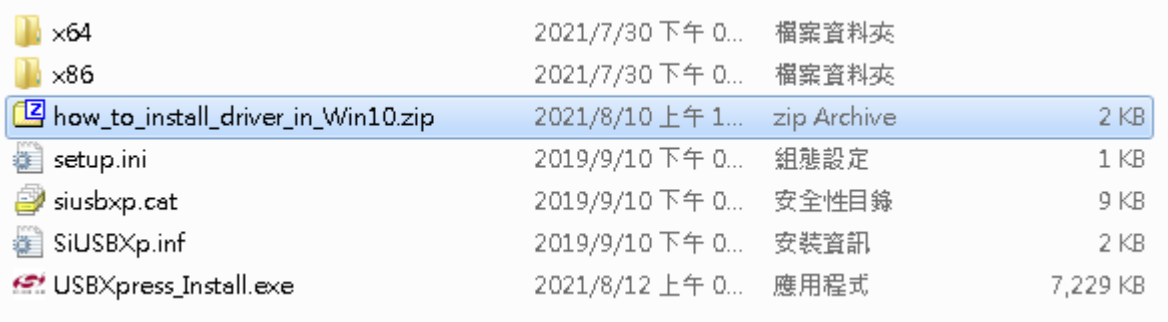



Figure 4-18

## 4.5 Introduction of software interface

There are 5 blocks in the main page of Flash Writer interface(as Figure 4-19 and Figure 4-20)：

(1) Writer connection picture：When Flash Writer connects to PC successfully, it will show a picture of Flash Writer. If Flash Writer disconnect to PC, the place will be disappeared.

(2) Function Block：There are 5 parts on the top of the main page: File, Security, Option, About, and Exit.

(3) Data Block：There are 3 data management functions. User can set IC parameters by "Type". Load file by "Load" and read the data from MCU flash rom by "Read IC". The destination location, device type and checksum are also showed in this block.

(4) Process Block：There are 4 operations Erase, Blank Check, Write, and Verify. It also shows the status of rolling code and protect.

(5) System Message：The operation record shows.

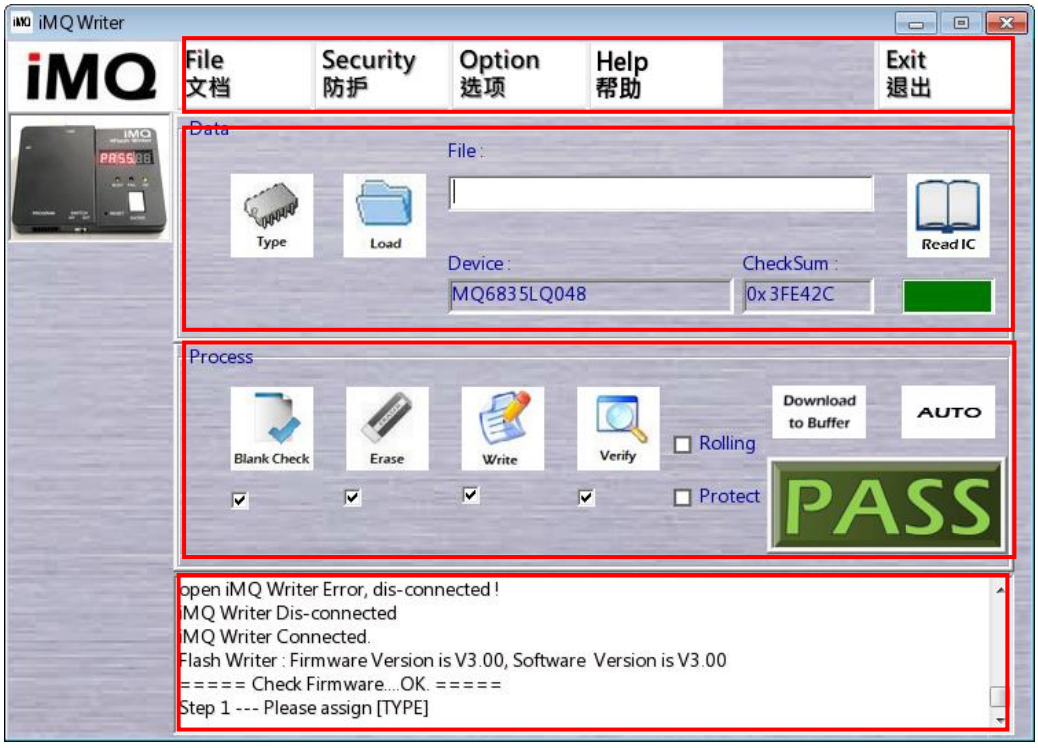
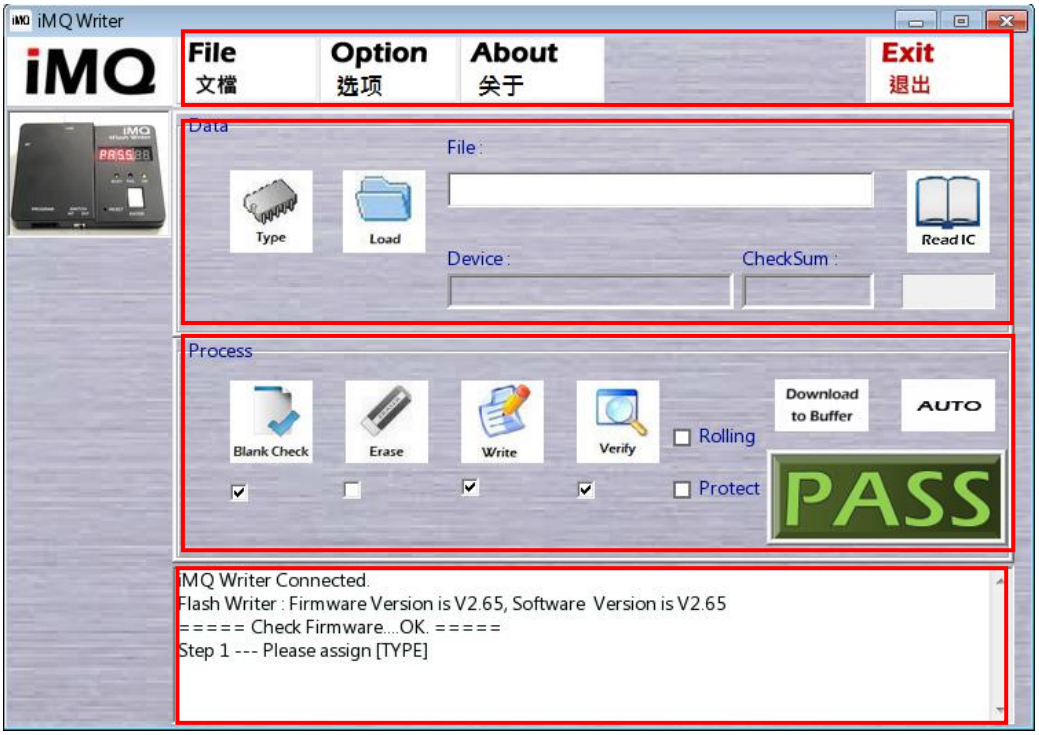



Figure 4-19 GUI of versions after V3.00 (including)

(1) Connection picture of Flash Writer




(2)Function

(3)Data

(4)Process

(5)System Message

Figure 4-20 GUI of versions of V2.xx

# 5. On-Line Programming

## 5.1 Basic connection

Flash Writer wire connections are as follows:

(1) Connect the corresponding pin of the IC to the Flash Writer program port via Dupont wires (refer to Figure 4-5).

(2) Connect the computer and Flash Writer by USB cable.

(3) Start the software of Flash Writer, then entry the main page (as Figure 5-1). When Flash Writer connected to PC successfully, it will show the picture of Flash Writer. If the connection failed, it will not show the picture.

(4) The function keys in the main page are described in following sections of Chapter 5 (refer to Figure 5-1 and Figure 5-2).

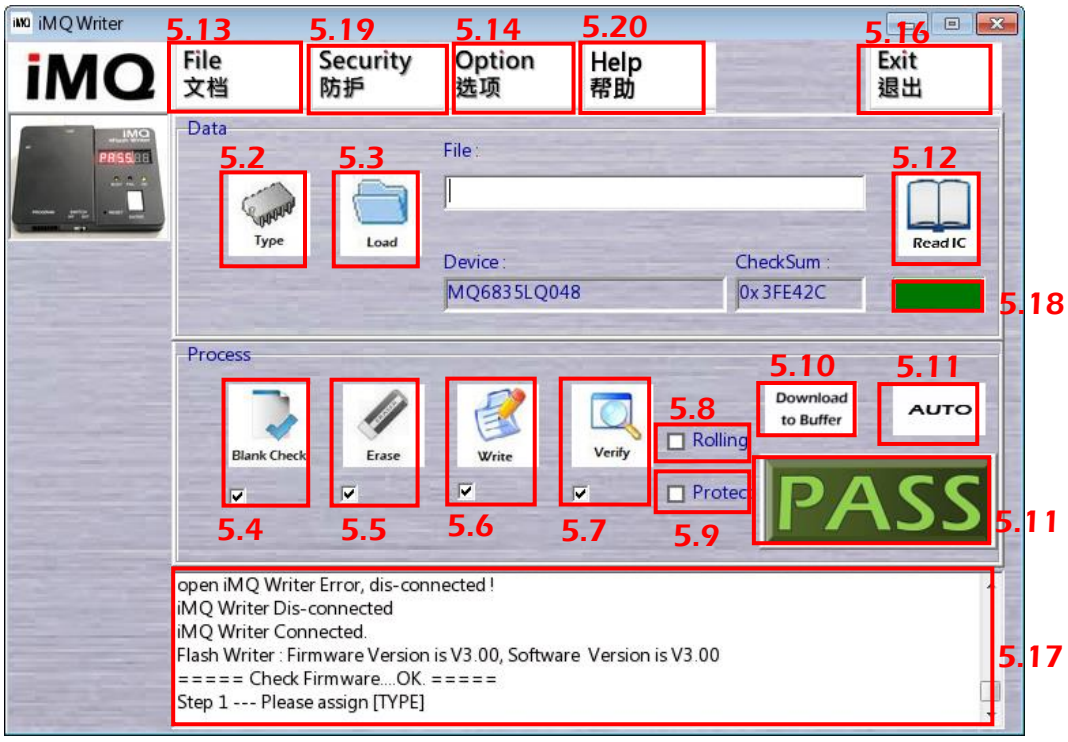



Figure 5-1 versions after V3.00 (including)

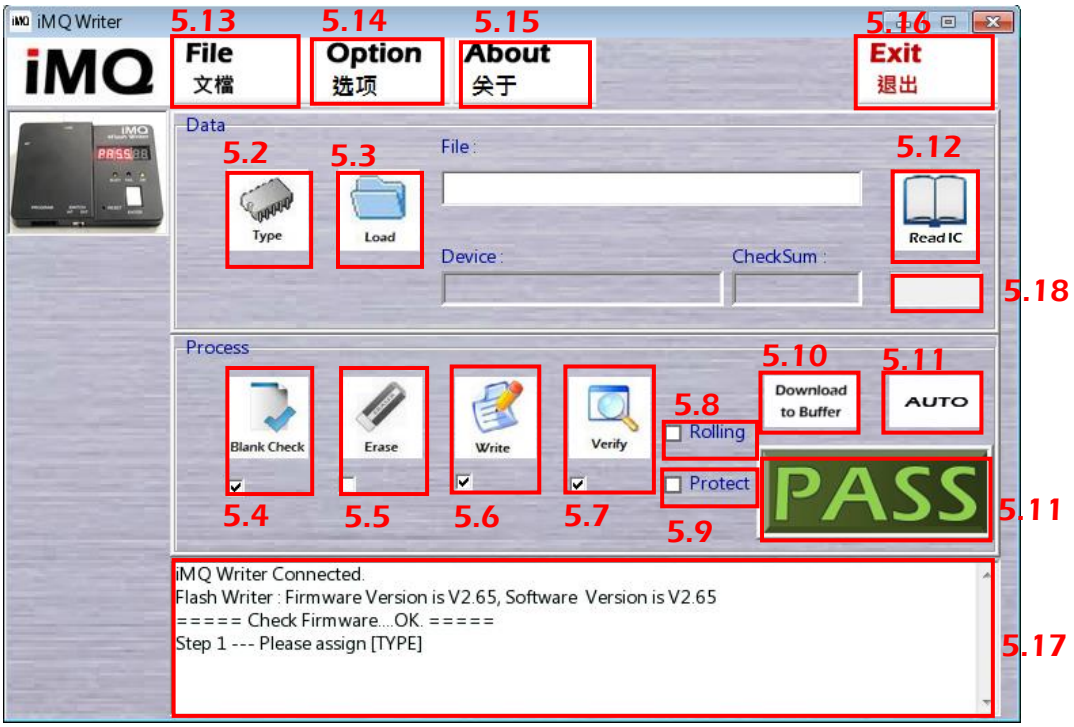



Figure 5-2 versions of V2.xx

## 5.2 Type (parameter setting)

This function key is used to set the basic parameters of MCU. The operation process as below:

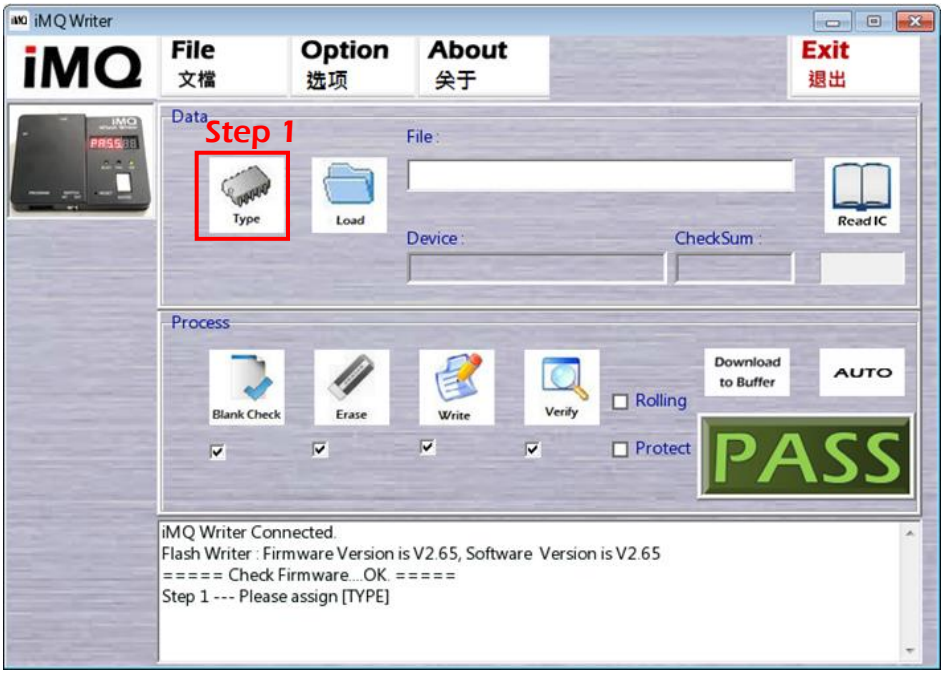



Figure 5-3 Select Type

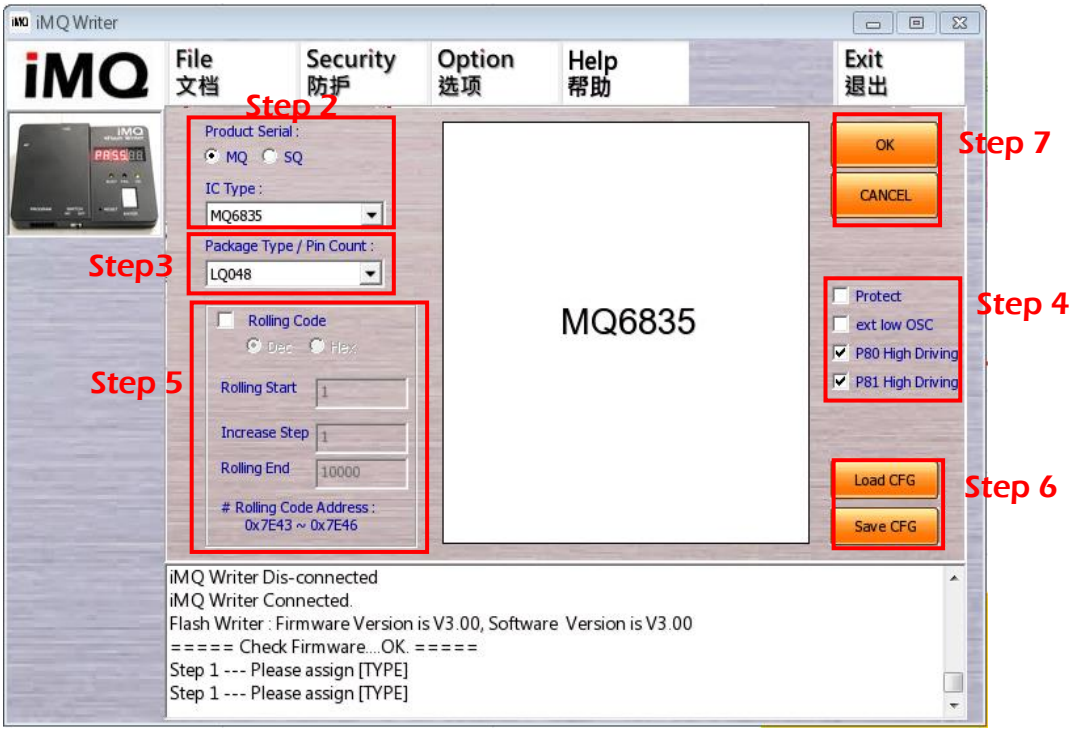



Figure 5-4 IC parameter Setting

Step 1: Press the "Type" button in Figure 5-3, and the IC parameter setting page appears, as shown in Figure 5-4.

Step 2: See Figure 5-4, first click the **(Product Serial)**, and then select the **(IC Type)**.

Step 3: See Figure 5-4, select the **(Package Type/Pin Count)**, please click the drop-down menu, for example, MQ6812 has LQFP32 (LQ032) or QFN032 (QN032 ) or SOP28 (SP028) or SSOP28 (SS028) options.

Step 4: Some IC function has to be set by writer. The function selected in step 4 will enable after programming IC and MCU reset to active. User can also set program protect function here; If it is not necessary, user can skip the setting by using default choice.

.

If selected IC is MQ6832 as an example, users can check P80 high current output **(P80 High Driving)**, check P81 high current output **(P81 High Driving)**, or check **(ext. Low OSC)** to select external low frequency crystal oscillator. Program encryption **(Protect)** can also be checked here. This step can be skipped if not required.

If selected IC is SQ7653 as an example, the user can choose the built-in boot loader using SIO as the writer interface **(ISP_SIO Prog)**, or the built-in OCD interface using DBG pin as the writer interface **(DBG Prog)**.

For program encryption, there are 4 ways can be selected:

1. "BL Password" — Set a password for the boot loader. When you want to update the firmware via boot loader in the future, you must enter the correct password.
2. "Disable BL" — Turn off the boot loader directly, and it will no longer be transparent through the boot loader.
3. "OCD Password" — Set a password for OCD. To update the firmware through OCD in the future, you must enter the correct password.
4. "Disable OCD" — Turn off OCD directly, and you can no longer communicate the chip through OCD interface

Step 5: Refer to Figure 5-5. If you need to program the rolling code to the IC, you can check the box in front of the Rolling Code text to enable this function, and you set the rolling code value.

Rolling code can support both DEC and HEX (as figure 5-5) input value. In addition, Rolling Start refers to the starting value, and Rolling End refers to the ending stop value. Increase Step refers to the code hopping interval data. If you key in "1", the number will increase by 1 each time; if you key in "3", the number will increase by 3 each time. The rolling code area is 0~4294967280(in DEC) or 0~ 0xFFFFFFF0 (in HEX). At the bottom, the address shows in where the rolling code is stored in the MCU info block.

This step can be skipped if there is no need to program the rolling code.

Rolling code in Dec


Rolling code in Hex


Figure 5-5 Rolling Code

Step 6: User can use "Save CFG" to remember the configurations from step1 to step 5 into a file. User can call previous IC setting and parameters by "Load CFG".

Step 7: Finish the setting, then click "OK" to back the main page, or "Cancel" to give up the settings this time. In main page, "Device" shows the IC type and package type/pin count. The "rolling" and "protect" is also checked if user set each one.

In addition, if you want to use the previously saved settings, press the "Type" button and the IC parameter setting page appears. You can press "Load CFG" at the bottom right shown in Figure 5-4 to recall the previous setting file.

Note: The calculation method of rolling code value is provided to facilitate customers to read the rolling code or verify whether the rolling code is correct. The rolling code value is recorded in the Info Block in the MCU, and rolling code address is as follows:

MQ68xx: Rolling code stored address – 0x7E43~0x7E46

MQ69xx: Rolling code stored address – 0x8000~0x8003

Assuming that R0, R1, R2 and R3 respectively represent the values at addresses 0xEFC0, 0xEFC1, 0xEFC2 and 0xEFC3 in the Info Block of MQ68xx, the rolling code value can be obtained according to the following formula:

$$\text{Rolling code value} = R0 + R1 \times 256 + R2 \times 256^{2} + R3 \times 256^{3}$$

Assuming that R0, R1, R2 and R3 respectively represent the values at addresses 0xEFF8, 0xEFF9, 0xEFFA and 0xEFFB in the Info Block of MQ69xx, the rolling code value can be obtained according to the following formula:

$$\text{Rolling code value} = R0 + R1 \times 256 + R2 \times 256^{2} + R3 \times 256^{3}$$

## 5.3 Load (File Loading)

This function is used to load H16 files. Click the "Load" button in Figure 5-1 to load the compiled H16 file for preparation before programming. After the H16 file is loaded, it will automatically return to the main screen. At this time, you can see the full path and file name in the "File" window of the main page, and the iMQ Checksum value is in the "Checksum" window:

iMQ Checksum = h16 Checksum + Info Checksum

"h16 Checksum" is the checksum value of the H16 file, and "Info Checksum" is the checksum value of the option settings on the Type page. The calculated h16 Checksum, Info Checksum, and iMQ Checksum results will also be displayed in the message prompt window.

## 5.4 Erase

This function is only used for MCU with Flash rom in order to erase the data stored in Flash.

In Figure 5-1, there is a check column below Erase button. If checked, it means that this step will be executed during auto programming (Auto).

## 5.5 Blank Check

This function is used to check the unused flash(0xFF) size of program memory. If the left program memory is not enough to program file, the system message will shows "Process Fail, ErrCode=03, ERR_Blank!!!"

As Figure5-1, there is a check box below the "Blank Check" Button. If the box be checked, then "Blank Check" function will be executed during auto programming (Auto).

## 5.6 Write

This function is to program code and the parameter settings into the MCU.

As Figure 5-1, if it is checked, it means that this step will be executed during auto programming (Auto).

## 5.7 Verify

This is used to verify the data written in program memory with the data in buffer of Flash Writer, after write procedure. If the result is consistent, the message box shows" Verify..... ===Process OK===" then shows "iMQCKSum" in the LCD display. If the result is not consistent, the message box shows "Process Fail, ErrCode=04, ERR_Verify!!!"

If user checked the box under "Verify" button, then "Verify" function will be executed during auto programming (Auto).

## 5.8 Protect (Program encryption)

There is a "protect" Button in process window. If user checks "protect"; the program file written to IC cannot be read again. This is higher security programming procedure.

Note: Generally, we suggest not click "Protect" in development stage. Otherwise, user can not able to read out the program content to verify.

## 5.9 Rolling

For the setting of rolling code option, please refer to the description in Step 5 on Figure 5-5 to find how to set rolling code.

## 5.10 Download to Buffer

This function is to download the programming file (including the H16 file generated by iMQ i87-IDE and the IC setting options on the Type page) into Flash Writer.

To perform this action, please press "Download to Buffer" button in Figure 5-1.

## 5.11 Auto Program

This is an intelligent programming action. Press the "AUTO" button in Figure 5-1 or Figure 5-2 to start the series actions.

There are six processes, user can set the auto program of six processes -"Erase", " Blank Check", "Write", "Verify", "Rolling", and "Protect". Complete setting the operation procedure, then click "Auto" to auto program.

For example: When only the small boxes below the three icons "Blank Check", "Write" and "Verify" are checked, pressing the "AUTO" button will execute "Blank Check" –>

"Write"- -> "Verify" steps, but will not execute the Erase step.

The checked settings of these 6 operating procedures will be showed on the Flash Writer 7-segment LED display in the form of English letter codes after pressing the "AUTO" button. Please refer to the description of "4.2 Message of LED display".

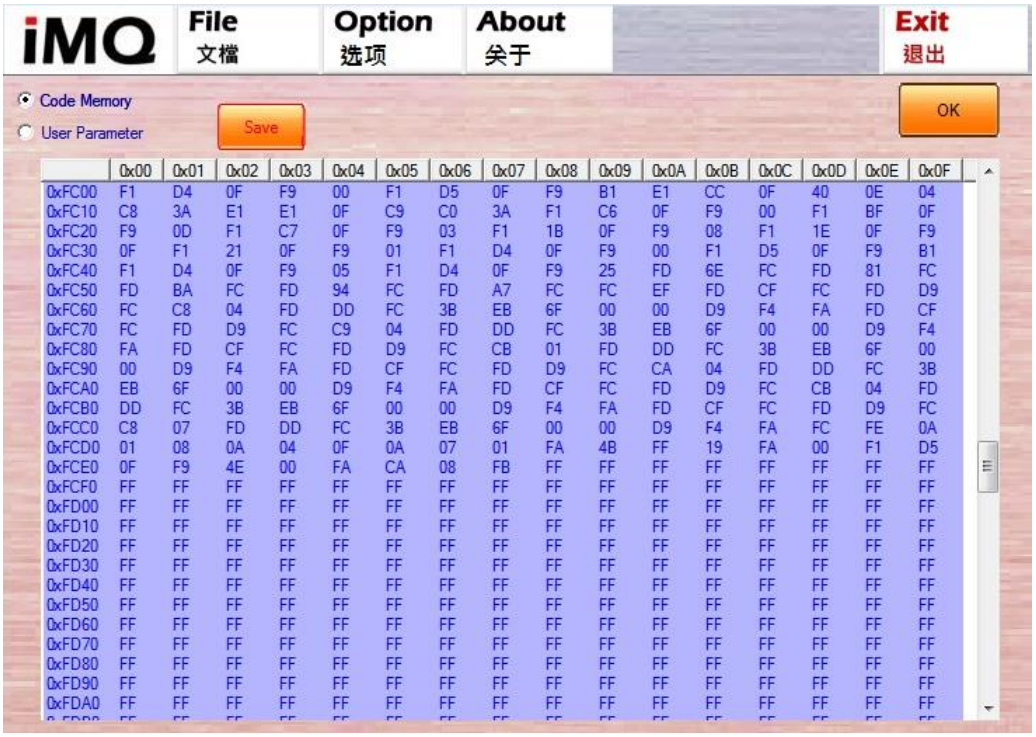
The execution result will be shown in the GUI window below the "AUTO" button, see Figure 5-6. If the green text "PASS" is displayed, it means the execution is successful; if the yellow text "BUSY" is displayed, it means the execution is still in progress; if the red text "FAIL" is displayed, it means the execution failed. Please check the error code shown on the Flash Writer, and refer to the error code description in "4.2 Message of LED display".


Figure 5-6 Result of operation

## 5.12 Read IC

There is a "Read IC" icon on main page screen. It is to read the program memory data in the MCU. When pressing the "Read IC" icon, user will enter the page for reading data. There are 2 options on the left-up side of the page, select "Code Memory" to read the H16 file data in Program Memory, as shown in Figure 5-7. Data are shown in blue background and blue font.
In addition, the read data can be saved by pressing the "Save" button to specify the file name and directory.

Note: When the displayed data are all "00", it means that the programmed data is all "00" or the program has been Protect.




| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0xFC00 | F1 | D4 | 0F | F9 | 00 | F1 | D5 | 0F | F9 | B1 | E1 | CC | 0F | 40 | 0E | 04 |
| 0xFC10 | C8 | 3A | E1 | E1 | 0F | C9 | C0 | 3A | F1 | C6 | 0F | F9 | 00 | F1 | BF | 0F |
| 0xFC20 | F9 | 0D | F1 | C7 | 0F | F9 | 03 | F1 | 1B | 0F | F9 | 08 | F1 | 1E | 0F | F9 |
| 0xFC30 | 0F | F1 | 21 | 0F | F9 | 01 | F1 | D4 | 0F | F9 | 00 | F1 | D5 | 0F | F9 | B1 |
| 0xFC40 | F1 | D4 | 0F | F9 | 05 | F1 | D4 | 0F | F9 | 25 | FD | 6E | FC | FD | 81 | FC |
| 0xFC50 | FD | BA | FC | FD | 94 | FC | FD | A7 | FC | FC | EF | FD | CF | FC | FD | D9 |
| 0xFC60 | FC | C8 | 04 | FD | DD | FC | 3B | EB | 6F | 00 | 00 | D9 | F4 | FA | FD | CF |
| 0xFC70 | FC | FD | D9 | FC | C9 | 04 | FD | DD | FC | 3B | EB | 6F | 00 | 00 | D9 | F4 |
| 0xFC80 | FA | FD | CF | FC | FD | D9 | FC | CB | 01 | FD | DD | FC | 3B | EB | 6F | 00 |
| 0xFC90 | 00 | D9 | F4 | FA | FD | CF | FC | FD | D9 | FC | CA | 04 | FD | DD | FC | 3B |
| 0xFCA0 | EB | 6F | 00 | 00 | D9 | F4 | FA | FD | CF | FC | FD | D9 | FC | CB | 04 | FD |
| 0xFCB0 | DD | FC | 3B | EB | 6F | 00 | 00 | D9 | F4 | FA | FD | CF | FC | FD | D9 | FC |
| 0xFCC0 | C8 | 07 | FD | DD | FC | 3B | EB | 6F | 00 | 00 | D9 | F4 | FA | FC | FE | 0A |
| 0xFCD0 | 01 | 08 | 0A | 04 | 0F | 0A | 07 | 01 | FA | 4B | FF | 19 | FA | 00 | F1 | D5 |
| 0xFCE0 | 0F | F9 | 4E | 00 | FA | CA | 08 | FB | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFCF0 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD00 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD10 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD20 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD30 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD40 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD50 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD60 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD70 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD80 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFD90 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |
| 0xFDA0 | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |

Figure 5-7 Code Memory

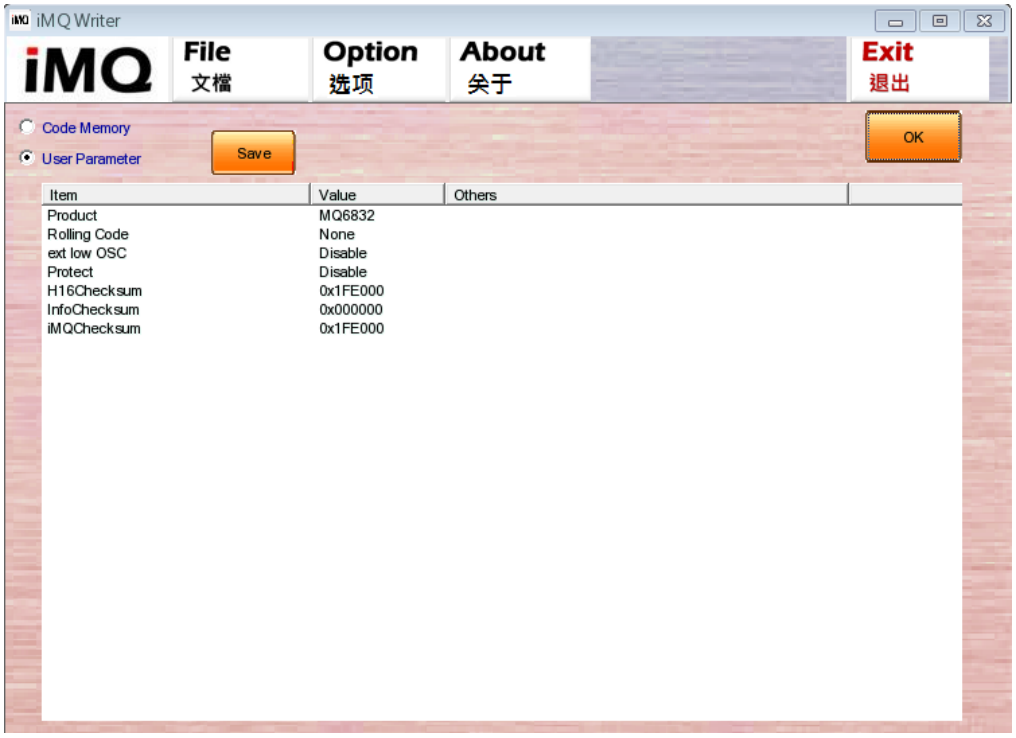



Figure 5-8 User parameters (MQ6832)

When "User Parameter" is selected, the special parameter settings for programming the MCU can be read out.

Taking MQ6832 as an example, the screen is shown in Figure 5-8. It is include the following items:

Example: MQ6832 (please refer to Figure 5-8)

| Item | Description |
|---|---|
| Product | IC model and version— MQ6832 |
| Rolling Code | Rolling code value.<br>Value in decimal (left) and hexadecimal (right).<br>If rolling code is not set, It shows "None". |
| Ext. low OSC | External slow clock<br>Enable: set; Disable: not set |
| protect | program encryption<br>Enable: encrypted; Disable: not encrypted |
| H16 Checksum | Display checksum of the h16 file |
| InfoChecksum | Display checksum of the cfg setting |
| iMQChecksum | Display checksum of the imq setting |

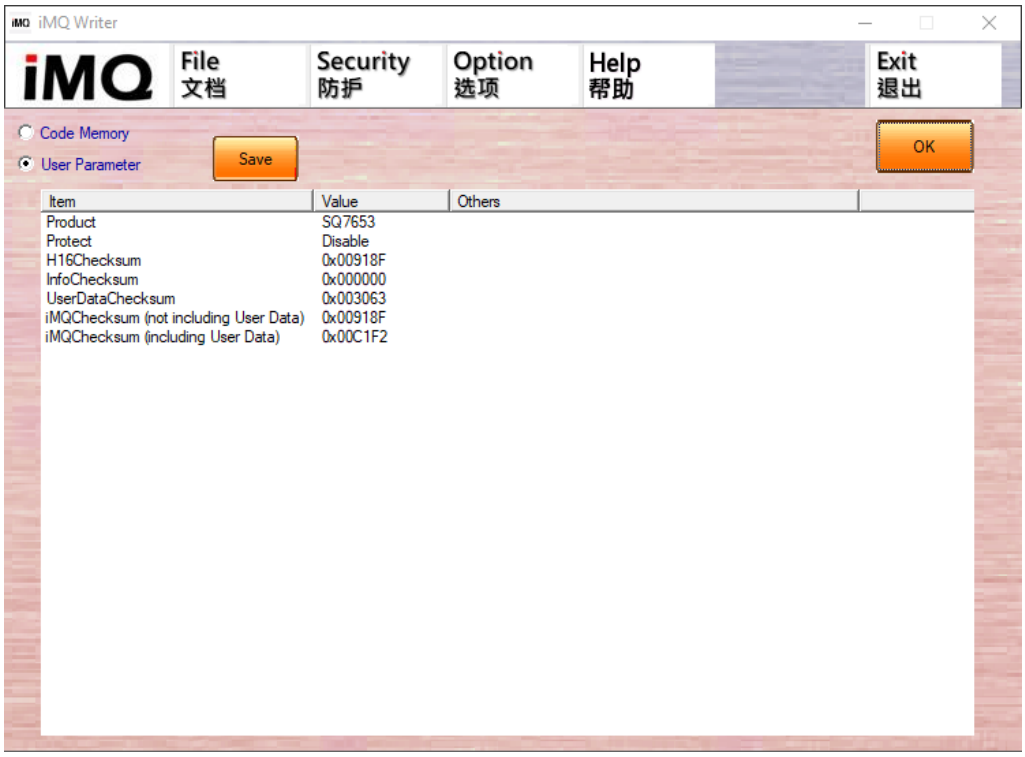



Figure 5-9 User parameters (SQ7653)

Example: SQ7653 (please refer to Figure 5-9)

| Item | Description |
|---|---|
| Product | IC model and version— SQ7653 |
| Protect | program encryption<br>Disable: not encrypted |
| H16 Checksum | Display checksum of h16 file |
| InfoChecksum | Display checksum of Info section |
| UserDataChecksum | Display checksum of EEPROM |
| iMQChecksum<br>(not including User Data) | checksum of imq summary(not include UserDataChecksum)<br>That is equal to H16Checksum + InfoChecksum |
| iMQChecksum<br>(including User Data) | checksum of imq summary(including UserDataChecksum)<br>That is equal to H16Checksum + InfoChecksum + UserDataChecksum |

## 5.13 File

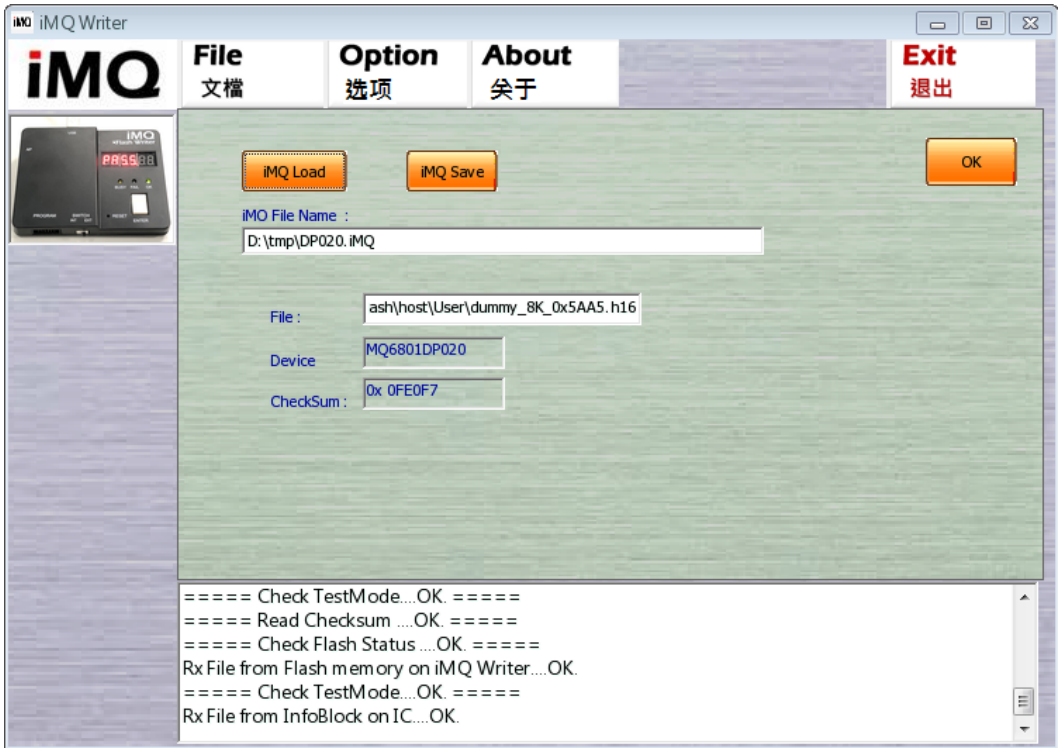



Figure 5-10 File option

Click "File" on the top of main page to enter the "File" page (as Figure 5-10). The usage details described as below:

(1) iMQ Load：User can select the previously saved "*.imq" file. After selection, the corresponding h16 file name, IC model and Checksum will be displayed in the "File Name" window, "Device" window and "Checksum" window respectively.
(2) iMQ Save：It can save the loaded "*.h16" file and setting parameters on the main screen as "*.imq" file for future use.
(3) iMQ File Name：The file name and destination location of "*.imq" file.
(4) File: The h16 file name and path stored in selected "*.imq" file.
(5) Device：The IC type and pin count of selected *.imq file.
(6) Checksum: The Checksum value of selected *.imq file.
(7) OK：After selecting *.imq file, user clicks "OK' to load the content to GUI for programming and back to main page.

## 5.14 Option

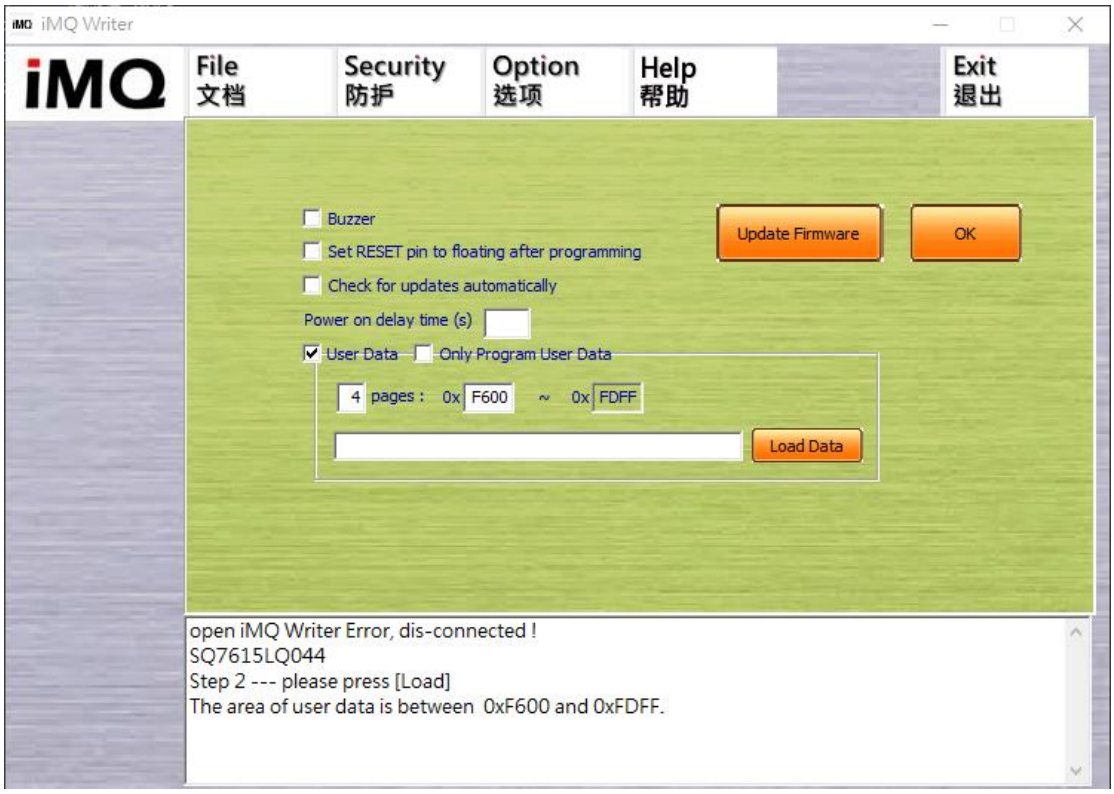



Figure 5-11 Option

In the main page, user clicks "Option" to enter the option page. The functions of option page as below:

(1) Buzzer：If user checked the "Buzzer", it will "beep" (1 short sound) when program successfully. It will "beep, beep ... ..." (1 short, 1 long sound) when program fail. Regardless of the "Buzzer" be selected or not, it would end with the sound "beep ... ... beep ... ... beep ... ..." (3 long sound), when the programming times meet the max value of rolling code.

(2) Update Firmware：Please refer to "9. Update the Firmware of Boot Loader".

(3) Flash Password Setting：Some Flash products need to enter a password when reading Program Memory, or while Erase is required after encryption. Please refer to "5.19 Protection" for details.

(4) Set RESET pin to floating after programming：If user checks this item , the Flash Writer will auto set the RESET pin to floating, and other program related pins are set to ground.

(5) Power on delay time：When the box is set, the writer will automatically delay the

time in seconds to the set value before programming. "Power on delay time" is only the positive integer value.

(6) Check for updates automatically：This function is reserved, it is not work now.

(7) User Data：When "User Data" is checked, it means that additional data of the customer needs to write into chip. The number of pages and the starting address need to be filled in "Only Program User Data".

(8) Only Program User Data：When "Only Program User Data" is checked, it means that only the data in the address range filled will be programmed. Data or program code originally in other addresses will not have any Revise.

(9) Load Data：When you press the "Load Data" button, you can choose user data files (currently only binary format can be accepted).

## 5.15 About

On the top of the main screen, click the "About" button, and a window will appear as Figure 5-12. The version of software is shown in the window. Click the "OK" button to leave it.


Figure 5- 12

## 5.16 Exit

Please refer to Figure 5-1. On the top of the main page, click the "Exit" button to leave this iMQ Flash Writer program.

## 5.17 System Message

Please refer to Figure 5-1, the message prompt window at the bottom of the main screen displays the historical records during the operation.

## 5.18 Progress bar

It is only supported after version V1.20 of software. There is a progress bar under the "Read IC" icon on the main screen. When executing "Read IC" or "Download to Buffer", the current progress % will be displayed in the progress bar until the progress is completed, as shown in Figure 5-13.

Figure 5-13 Progress Bar

## 5.19 Protection

### 5.19.1 MQ69xx Password

When the data is programmed into the Flash product, even though protect is not set, if you want to erase the encrypted Flash data or read the Flash data in the MCU, there are 2 methods:

Method 1: Please load the corresponding programming file on the host computer, then execute "Download to Buffer" button let the data into the buffer of Flash Writer, so that the encrypted data in Flash can be erased or read Flash data in the MCU.

Method 2: Go to the "Security" page, entering hexadecimal values in the PNSA (Password Count Storage Address), PCSA (Password Comparison Start Address) and Password respectively, as shown in Figure 5-14. The 3 password numbers will have different values according to different programming files (details in the following section). Then press the "OK" button to return to the main screen, and then execute "Download to Buffer" to erase the encrypted Flash data or read the Flash data in the MCU.

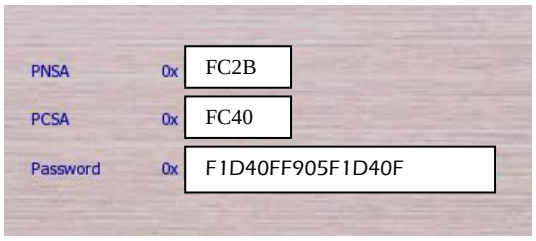
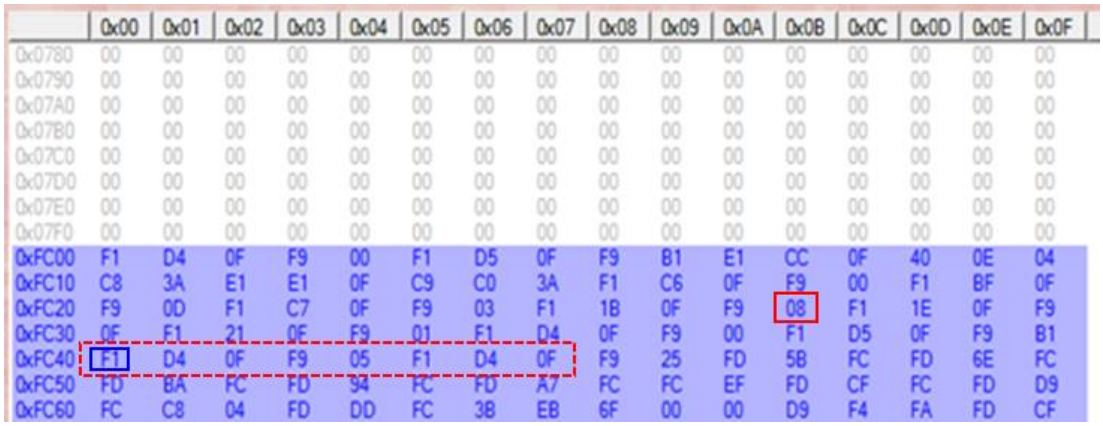



Figure 5-14 MQ69xx Password

The meanings and selection methods of PNSA, PCSA and Password will be explained as follows:

- PNSA: The value of this address in the programming file represents the Length of the Password String, the range is 0xC000~0xFEFF.
- PCSA: The address in the programming file represents the Starting Address of the Password String, the range is 0xC000~0xFE00.
- Password String: The password string to be compared.

For example, the programming file is as in Figure 5-15:



| | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x0780 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x0790 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07A0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07B0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07C0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07D0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07E0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0x07F0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 0xFC00 | F1 | D4 | 0F | F9 | 00 | F1 | D5 | 0F | F9 | B1 | E1 | CC | 0F | 40 | 0E | 04 |
| 0xFC10 | C8 | 3A | E1 | E1 | 0F | C9 | C0 | 3A | F1 | C6 | 0F | F9 | 00 | F1 | BF | 0F |
| 0xFC20 | F9 | 0D | F1 | C7 | 0F | F9 | 03 | F1 | 1B | 0F | F9 | 08 | F1 | 1E | 0F | F9 |
| 0xFC30 | 0F | F1 | 21 | 0F | F9 | 01 | F1 | D4 | 0F | F9 | 00 | F1 | D5 | 0F | F9 | B1 |
| 0xFC40 | F1 | D4 | 0F | F9 | 05 | F1 | D4 | 0F | F9 | 25 | FD | 5B | FC | FD | 6E | FC |
| 0xFC50 | FD | BA | FC | FD | 94 | FC | FD | A7 | FC | FC | EF | FD | CF | FC | FD | D9 |
| 0xFC60 | FC | C8 | 04 | FD | DD | FC | 3B | EB | 6F | 00 | 00 | D9 | F4 | FA | FD | CF |

Figure 5-15 example file

- Enter "0xFC2B" in the PNSA field: Since the value of this address is 0x08, as shown in the Figure 5-15 circled by the red solid line, the length of the Password String is 8

bytes

- Enter "0xFC40" in the PCSA field, which means that the starting address of the Password String is 0xFC40, the number circled by the blue solid line in Figure 5-15.
- Enter "0xF1D40FF905F1D40F" in the Password String field, and the value of 8 bytes starting from 0xFC40 will be used as the Password String, as shown in the number circled by the red dotted line in Figure 5-15.

### 5.19.2 SQ7xxx product password input function

When the data is programmed into the Flash product, even though protect is not set, if you want to erase the encrypted Flash data or read the Flash data in the MCU, there are the following 2 methods:

Method 1: Please load the corresponding programming file on the host computer, and then execute the "Download to Buffer" button to let the data into the buffer of Flash Writer, so that the encrypted Flash data can be erased or read The data of Flash in the MCU.

Method 2: Please enter the hexadecimal values in the BL Password (Boot loader Password) and the OCD Password in the "Security" page, as shown in Figure 錯誤! 找不到參照來源。5-16. Then press the "OK" button to return to the main screen, and then execute "Download to Buffer" to erase the encrypted Flash data or read the Flash data in the MCU.

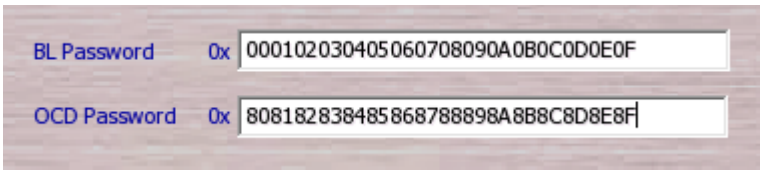



Figure 5-16 SQ76xx Password

## 5.20 Help

On the top of the main page, click the "Help" button, and a window will appear as shown in Figure 5-17. The version of this software and the contact information with iMQ technology Inc. are recorded in the window. Click the "OK" button to leave the window.


Figure 5-17 Help

# 6. Programming Procedure

(1) Click "Type" to enter the page to set IC type, package type/pin count, rolling code, and other functions. User can refer section "5.2 Type (parameters setting)". After setting, click "OK" back to main page. User can confirm the setting of IC type/pin count....etc. If user have set rolling code, please confirm the "Rolling" be checked. If user has set protect function, please also confirm the "Protect" be checked.

Note: Generally, in the early stage of research and development, in order to confirm the programmed content, it is recommended not to check "Protect", otherwise after programming, the content comparison will no longer be read out.

(2) On the main screen, click the "Load" button and select the "*.h16" file. After selection, it will return to the main screen. Please check whether the file path and name displayed in the "File" window and the value displayed in the "Checksum" window are correct.

(3) Determine the steps that need to be executed when auto programming, and tick the steps that need to be executed in the "Process" block. For Flash products, the process of "Erase" → "Blank Check" → "Write" → "Verify" will be suggested.

(4) Then execute the "Download to Buffer" button to load the data into the buffer of the Writer.

(5) Press the "AUTO" button to complete the programming steps set in step (3). If the programming is successful, the green "PASS" text will appear on the main screen. If the programming fails, the red text "FAIL" will appear on the main screen. At this time, please refer to the error code in "4.2 Message of LED display".

# 7. Off-Line Programming

(1) If you want Flash Writer to operate independently, you must download the program to be programmed, configuration settings, or rolling code function through the computer in advance and load the data to the writer before you can execute offline operation.

(2) After connecting the MCU programming pin with the corresponding programming pin of the programmer, press the ENTER button to start programming.

(3) The LED will turn green when programming is complete, and the word "PASS" will be displayed on the 7-segment display. If the programming fails, the LED will light up red, and the 7-segment display will display the word "FAIL". In addition, if "Buzzer" is checked on the "Options" page and the data has been loaded into the writer, the Buzzer on the writer will make a short "beep" when the programming is successful; There will be a short beep and a long beep of "beep... beep..." while programming fail.

(4) If the programming procedures include "Verify", but not include Rolling Code, the 7-segment display will only show the Checksum after the programming is completed.

(5) If the programming procedures include both "Verify" and "Rolling Code", the 7-segment display will show Checksum and Rolling Code every programming until the final rolling code is reached. When the last number previously set is exceeded, the buzzer on Flash Writer will loudly beep 3 long sound of "beep...beep...beep..." and make the program button (Push Button) invalid.

# 8. Update Firmware of Flash Writer

## 8.1 Boot loader firmware

When using the boot loader function for the first time, you need to use Silicon Lab's USB Debugger ICE tool to program the boot loader Firmware. If the boot loader firmware has already been on the iMQ Writer, you can skip this step and go directly to 8.2 to update the iMQ Writer Firmware.

Open the Silicon Laboratories Flash Utility application software, and after connecting the iMQ Flash Writer, download and program the boot loader firmware.

Step 1: Please select Download Filename, and select the file named "USB_F38X_64K.hex" according to the storage path.
Step 2: Please tick Erase all code space before download option.
Step 3: Execute the "Download" button.
Step 4: Execute the "Go" button.

At this point, the boot loader firmware has been programmed to the iMQ Flash Writer successfully.

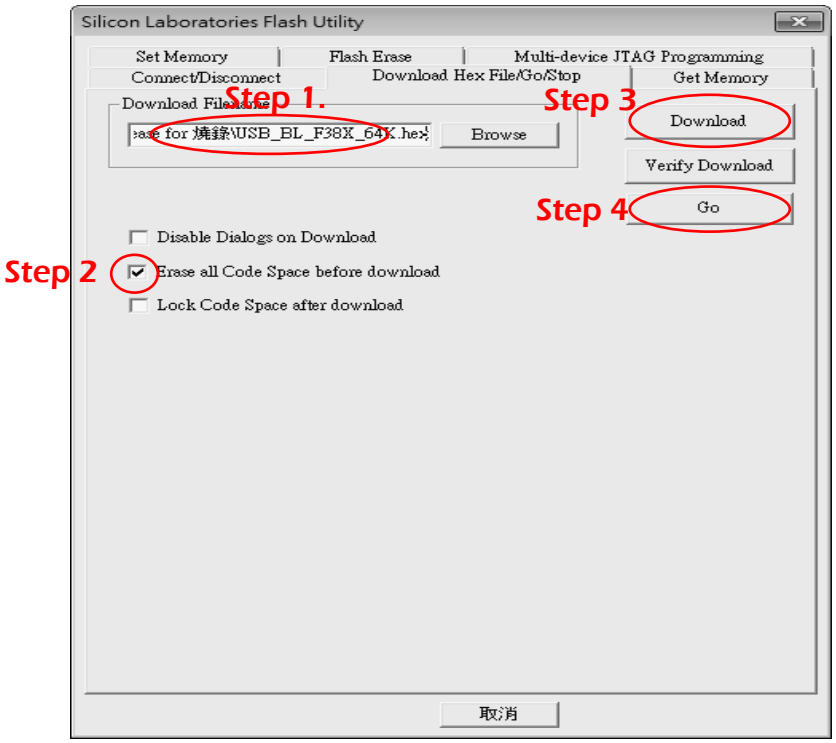



Figure 8-1

## 8.2 Update Flash Writer firmware

Press the "Option" button in the main screen, and you will find the "Update Firmware" button in the pop-up window and execute it.

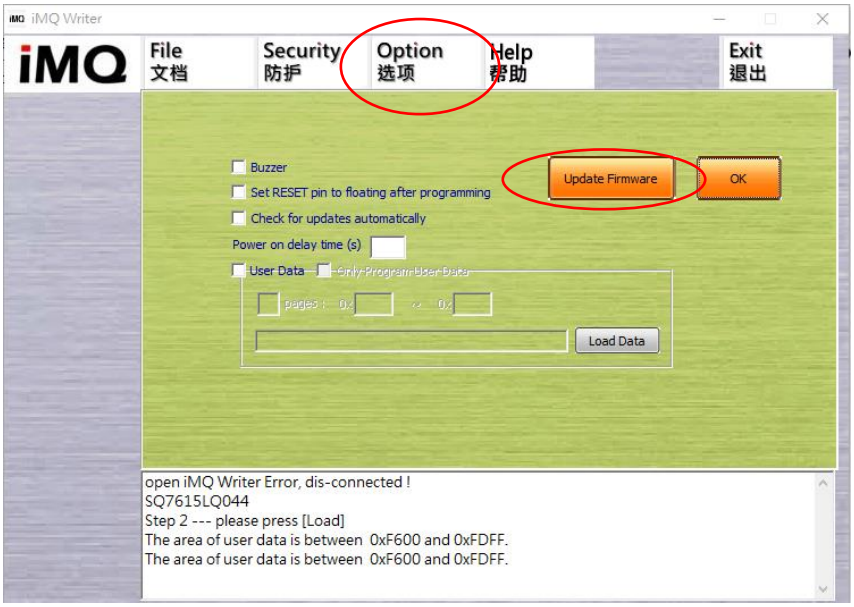



Figure 8-2

At this time, "iMQ Bootloader ToolBox" window as shown in Figure 8-4 will pop up.

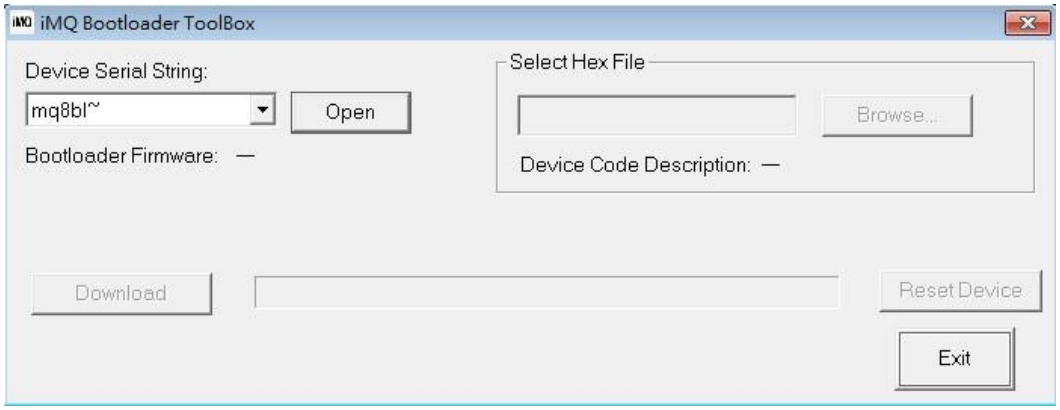



Figure 8-3

If you cannot see the words "mq8bl~" in the Device Serial String field, please perform the actions shown in Figure 8-4:

Step A: Keep pressing the Enter key.
Step B: Unplug the USB cable, and plug it in again to power on the Flash Writer.


Figure 8-4

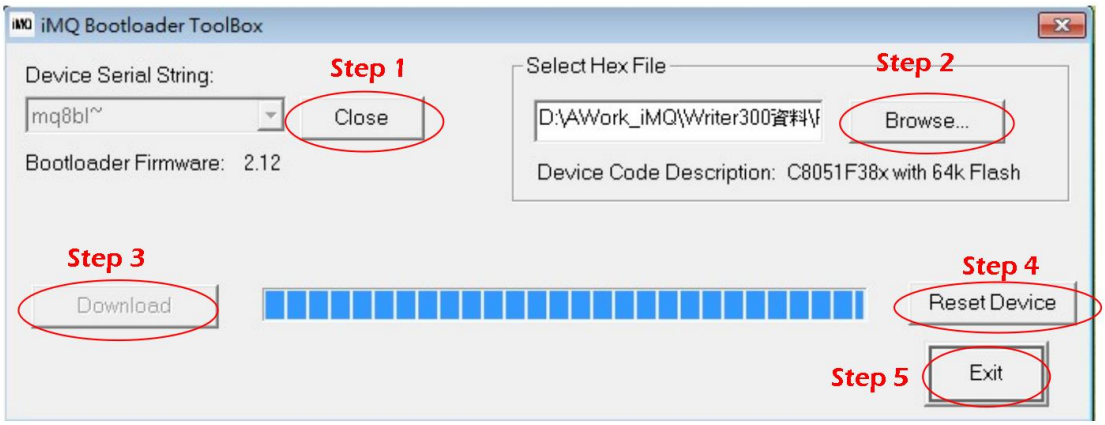



Figure 8-5

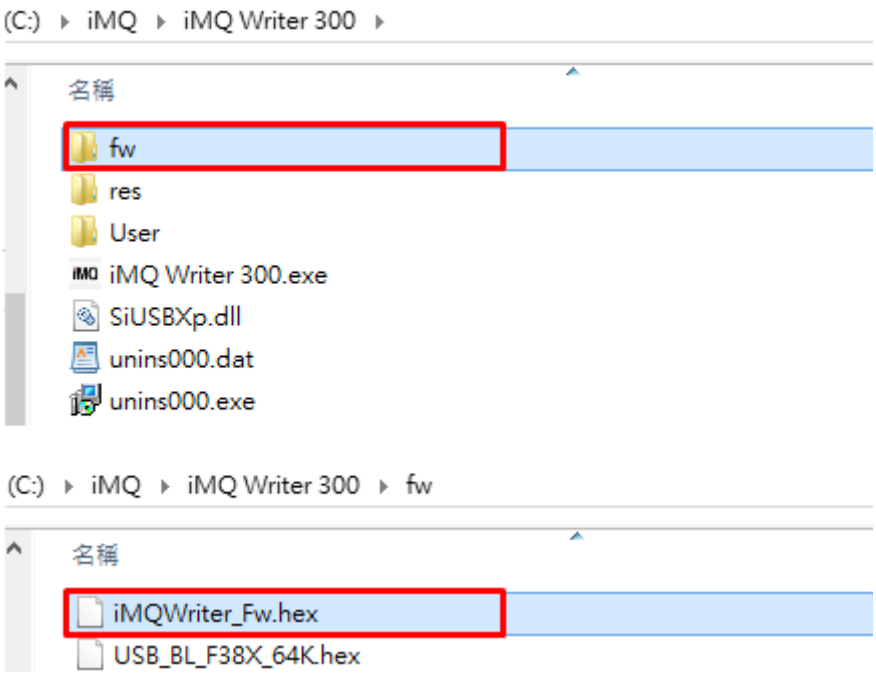



Figure 8-6

If you see the words "mq8bl~" in the Device Serial String field, it means that the host computer GUI software has successfully connected with the boot loader firmware of the Flash Writer. At this time, you can continue to update the firmware of the iMQ Flash Writer. Please refer to the following steps shown in Figure 8-5 and 8-6:

Step 1: Click "Open" If connection is successfully, the key will change to "Close" and it will shows the version of "Bootloader Firmware"
Step 2: Click "Browse" to select the new updating Flash Writer firmware. The file is in "fw "folder, and the name is "iMQWriter_Fw.hex" as Figure 8-6.
Step 3: Click "Download" key to update the file.
Step 4: Click "Reset Device" button to let Flash Writer power-off and power-on again, loading the new updated Flash Writer firmware successfully now.
Step 5: Click "Exit" key to leave the window.

# 9. Connect to auto programming machine

## 9.1 Flash Writer setting

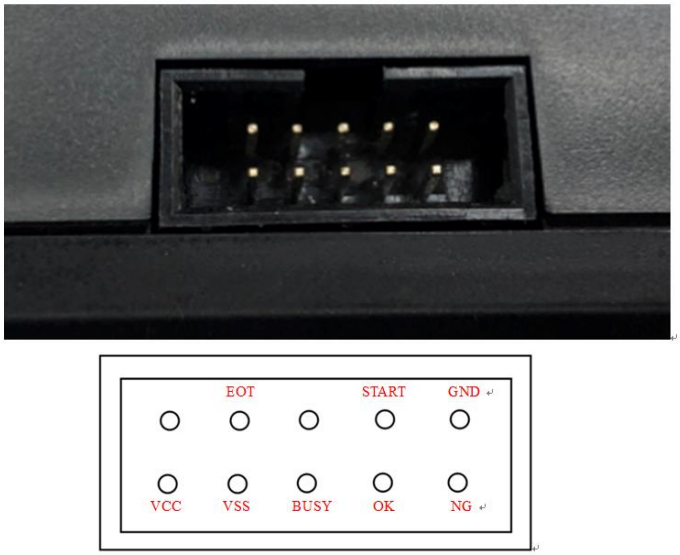



Figure 9-1 the AP port

Step 1: Step 1 ：As Figure 9-1, connect OK, BUSY、NG、START ,EOT signal cable, and GND to corresponding pins of auto programming machine. The pins may be different because of the different programming machines.

Step2 ：According to the parameter table of auto programming machine (as Table 9-1), user sets the parameters. OK signal, NG signal and EOT signal are effective and low active. Busy signal depends on the auto programming machine, the minimum is 25ms.

Step3 ：Reference the instruction of product programming pins, user connect the program pin to correspond pins via dupont line.

## 9.2 Auto programmer parameters and signal waveforms

CH1_ START: trigger action at 100ms

CH2_BUSY: The signal is low during programming; it returns to high after programming

CH3_OK: Programming is complete, output low potential

CH4_NG: bit error, no potential change

EOT: When programming is completed, the corresponding signal waveform is the same as CH3_OK; if it is wrong, the EOT signal is the same as CH4_NG

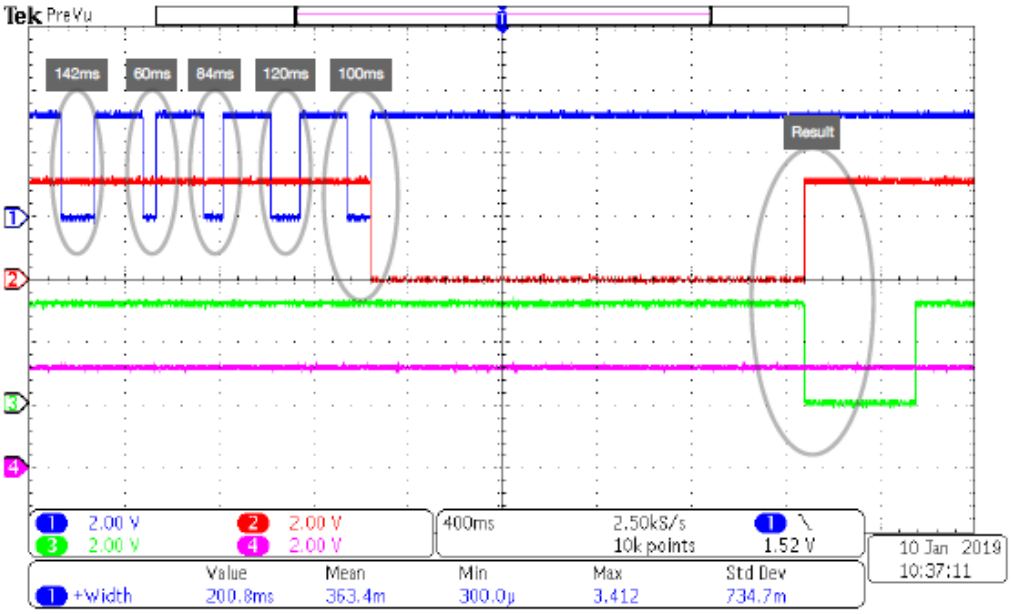



Figure.9- 2 Signal od AP

## 9.3 Auto programmer parameter setting

| Parameter of auto programming machine | | |
|---|---|---|
| Name of Parameters | Value ( IMQ ) | Description |
| DelayHoldTime | 50 | IC in the program area, then hold the IC after a time period. (Unit: ms) |
| DelayStartTime | 100 | Detect the IC is hold, then delay start time for stable status. (Unit: ms) |
| StartSignalWide | 100 | The pulse width of the start signal. (Unit: ms) |
| WriteTimeLimit | 10 | After start signal, and there is no finish signal detected in the write time limit. It reports "Time out" ,and stop holding IC. (Unit: s) |
| NumbersLimit | 25 / 50 / 100 | The maximum volume of the tube for IC. When it meet the number, stop supplying IC, and shows the remind message. (Unit:pcs) |
| AutoWriteType | A, B, AB | One unit to auto writer or two units(A,B) programmer at the same time. |
| BuzzerAlarm | Y / N | Set the buzzer alarm when fault occurs. |
| WriterID | 0——12 | Select standard signal or corresponding writer ID. |
| StartSignal | L | Set the active level to enable the signal.<br>L：low level active<br>H：high level active |
| BusySignal | X | Set the active level of busy signal<br>L：low level active<br>H：high level active<br>X：invalid ( do not use this signal cable ) |
| OKSignal | L | Set the active level of OK signal.<br>L：low level active .<br>H：high level active. |
| NGSignal | L | Set the active of NG signal<br>L：low level active<br>H：high level active |
| DelayCheckBusy | 100 | Set the time interval between finish sending "start " instruction and start to verify the programming status. (Unit: ms) |
| EOTDDebounce | 10 | Set busy signal active. When it finishes |

| | | |
|---|---|---|
| | | programming, the busy status will change to ready from busy status. In this time, if the signal is always ready, then continue to verify the OK and NG signal. |
| iOKNGDebounce | 10 | If there is no busy signal, it will verify "ok" and "NG" signal when completing sending the start instruction.<br>During the serial time of de-bounce, detect stable "OK" /"NG" signal, it will judge "OK" or NG". |
| TwoSocketFlag | N | Set to programmer two IC at the same time. The flag is "Y" : There are ICs in Socket A, and socket B separately. And send "start program" instruction at the same time. |
| NGRetryTimes | 2 | Programming NG. Try to program again or not. "0 ": not retry again. |

Table 9-1

## 9.4 Auto programming process

The process of auto programming is as below. The steps may be partial changed according to different programming machines.

Step1：Charge in IC, and hold it.
Step2：Send "Start" instruction to the programmer.
Step3：After time of "DelayCheckBusy" , continued to step4.
Step4：Verify "OKSignal" and NGSignal" . If "OKSignal" and NGSignal" are H then continue to step5. If "OKSignal" and NGSignal" are not H, then back to step 2.
Step5：Verify "NGSignal". If "NGSignal" us L, it means the programming NG, continue to step 7, otherwise continued to step 6.
Step6：Verify "OKSignal" If "OKSignal" is L, it means the programming successful, continued to step 7; otherwise，back to step 5.
Step7：Discharge according to OK or NG results.
Step8：Continue to program next IC (back to step1).
Step9：Because the IC stock or other reasons, the good IC may be misjudged as NG IC. One suggestion is to program the NG IC again.