Secure Writer User Manual V1.3

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1. Use environment

Before using Secure Writer, please confirm the system specifications of your computer.

- Microsoft Windows 10 Operating System.
- Microsoft .NET Framework 4.8 or above。

note：Download for Microsoft.NET Framework 4.8

2. Contents of Secure Writer

(1) 1 set of Secure Writer.

(2) USB cable with a set of transformers.

(3) A copy of operation software.

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3. Overview of system functions

The appearance of iMQ Secure Writer shown in Figure 3-1. It supports "online programming mode" (On Line mode) connected to a PC, and "offline programming mode" (Off Line mode) not connected to a PC. Secure Writer can support both SQ series encryption chips and SQ series general-purpose MCU programming.

In the online programming mode, we use USB Cable to connect the programmer to PC, and through the graphical user interface (GUI) software to operate.

In the offline programming mode, the programming data must be download to the writer through the graphical interface software on the PC site, the user can operate the writer without connecting to the PC.

The functions of this programmer mainly include:

(1) Programming the contents of the file compiled by iMQ IDE into the Program Memory of the MCU, read and verify whether the burned data is correct.
(2) The data in Program Memory could be read out by using the graphical user interface software, then you can stored as a file on the PC for viewing. When the user saves the file, he can set a password to keep it confidential.
(3) Burn the key or USER DATA into SQ series encryption chips or products with Security Processor (egSQ7515).
(4) Stable and encrypted programming function that is not affected by power failure or reset (the function is limited to the Key and USER DATA).
(5) The writer can provide On Line and Off Line mode programming.
(6) Support programming with internal power supply (3.3V provided by Secure Writer) or programming with external power supply. It depends on the DUT VDD power selection switch
a. When internal power supply selected for programming, the output voltage is 3.3V, and the load current should be less than 300mA.
b. When external power supply selected for programming, the input voltage should be within the range of 3.3V ~ 5.0V.
(7) The message will be display on the screen of Secure Writer. When programming failure occurs, you can troubleshoot the problem according to the displayed message, shortening the troubleshooting time.
(8) The AP (automatic programmer) connection interface of the Secure Writer has the design of noise prevention. The fully isolated signal design can isolate the AP side and Secure Writer side to prevent interference.
(9) Compact size, Good Stability.

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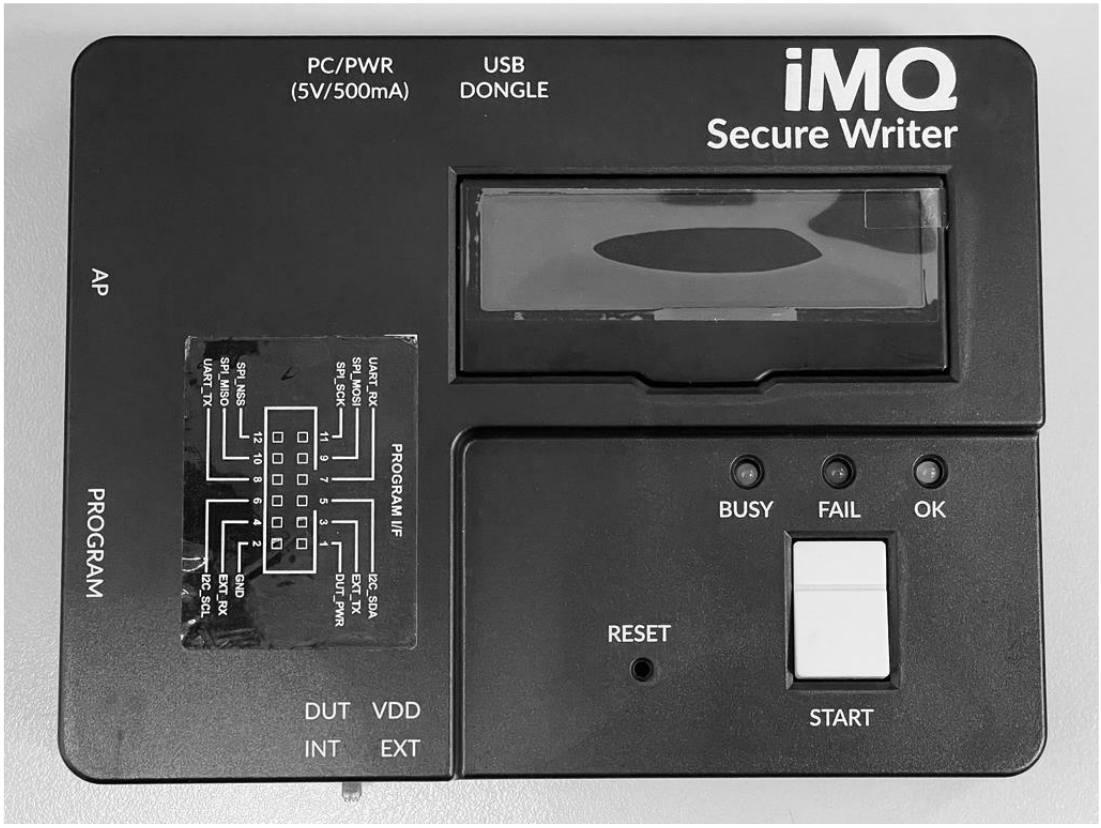

Figure 3-1 Secure Writer appearance

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4. Secure Writer System Introduction

4.1 Hardware

The appearance of the Secure Writer shown as follows:

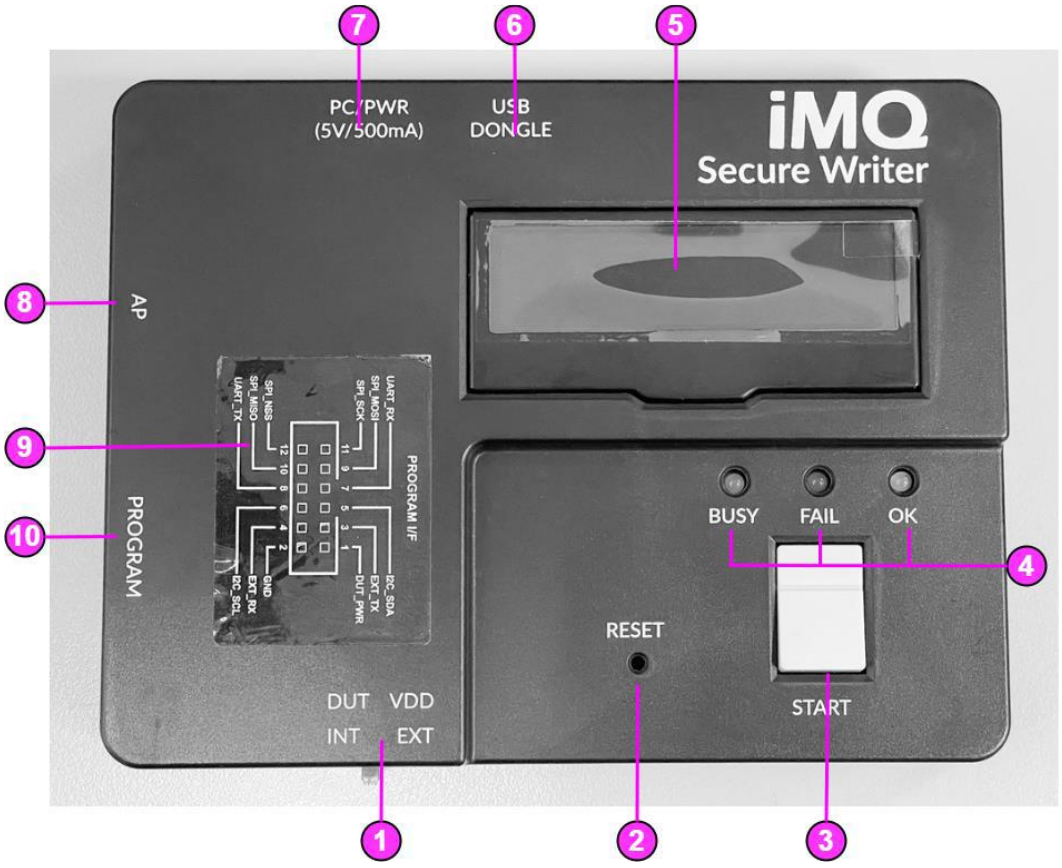

Figure 4-1 Secure Writer overlook

Figure 4-2 Secure Writer side view1

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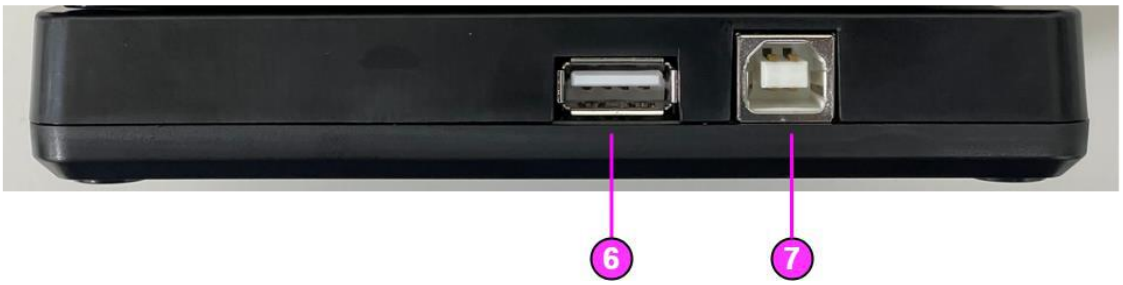

Figure 4-3 Secure Writer side view 2

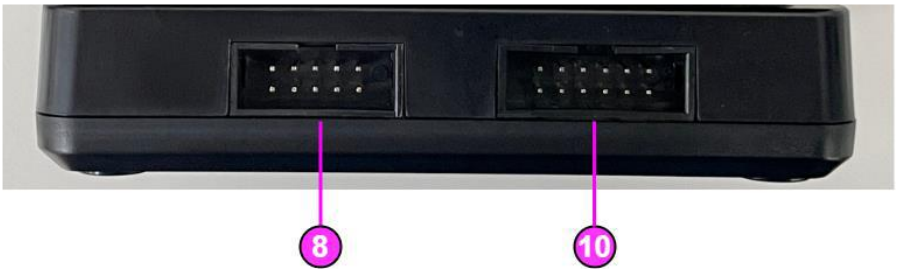

Figure 4-4 Secure Writer side view 3

No	name	Description
1	DUT power selection switch (DUT VDD)	DUT power selection INT position: 3.3V provided by Secure Writer EXT position: external power supply from PROGRAM interface, input range 3.3V ≦ V_EXT ≦ 5V
2	Reset button (RESET)	Click to reset the system
3	Start button (START)	Click the button to start operation
4	Indicator light (BUSY/FAIL/OK)	Operation State : Yellow: busy (BUSY), Red: programming failed (FAIL), Green: burning success (OK)
5	Display screen	show status information
6	USB Dongle interface	Connect the USB Dongle
7	Computer/adapter interface (PC / POWER)	Connect computer or adapter
8	Automatic Programming machine interface (AP)	Connect to an automatic programming machine to increase programming efficiency
9	PROGRAM interface pin definition	DUT interface pin definition mark
10	DUT interface (PROGRAM)	Connect the DUT, the connection method refers to " PROGRAM interface pin definition "

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4.2 DUT connector

The pin definition of the DUT connectors are as marked on the sticker:

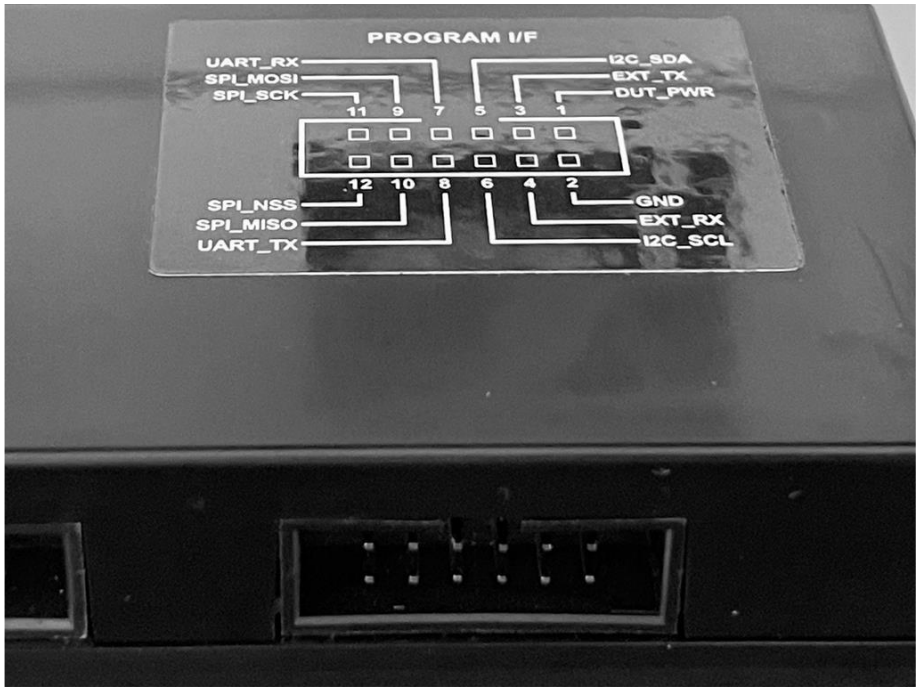

Figure 4-5 DUT Connector

Product line	Interface	Pin No								Note
		5	6	7	8	9	10	11	12	
Secure ASIC (SQ7101)	I2C	I2C_SDA	I2C_SCL							
Secure ASIC (SQ7103)	SPI					SPI_MOSI	SPI_MISO	SPI_SCK	SPI_CS	
Secure ASIC (SQ7131)	I2C	I2C_SDA	I2C_SCL							
Secure ASIC (SQ7133)	SPI					SPI_MOSI	SPI_MISO	SPI_SCK	SPI_CS	
Secure ASIC (SQ7135)	SWI+SPI				SWI	SPI_MOSI	SPI_MISO	SPI_SCK	SPI_CS	SWI switch TX/RX
SQ7515	OCDE +I2C	I2C_SDA	I2C_SCL		DBG				RESET	DBG switch TX/RX
SQ7613 SQ7615 SQ7617 SQ7653	OCDE				DBG				RESET	DBG switch TX/RX

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4.3 Automatic programming machine connector

Automatic programming machine interface, connected to the automatic programming machine through a flat cable.

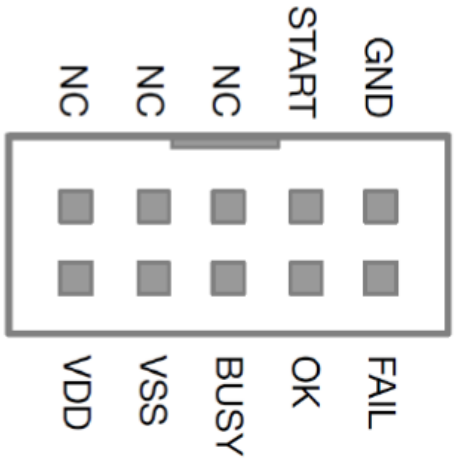


Figure 4-6 Automatic programming machine connection

4.4 Information Display

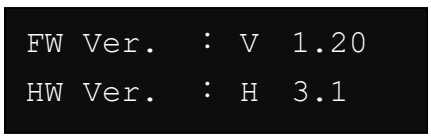
The OLED information display can show information such as hardware and software version, IC model, check code, operating procedure, and error code. It provides instant messages during operation. Users can know the status of the device under test or the programmer through the OLED information display.

4.4.1 Display Message

A. Power-On Message：

When the writer is power-on or the Reset button is pressed, it will be display sequentially

(1) Software and hardware version



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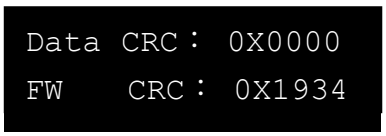
(2) Model of the DUT

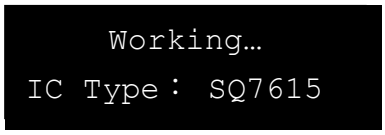
(3) DATA CRC / FW CRC



B. Programming Message：

When the writer executes the programming action, it will be display sequentially

(1) The current state of the programmer and the model of the DUT

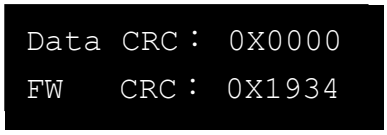


(2) Action Result

Program Success

Program Failed

(3) Standby screen: After action, it will automatically switch to the standby screen



Under normal operation, every time the programming button pressed to perform programming, the OLED display will show the programming result. If an error occurs, the corresponding error message will display.

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4.4.2 Error Message List

Error Message	Description
Self-Test Fail	Writer self-test failed
Mem CRC Fail	Internal data read back verification failed
Power Fail	Writer system power supply is abnormal
DUT PWR Fail	The power supply of the object under test is abnormal. Please confirm whether the power supply of DUT selected correctly. If you choose an external power supply, please confirm that the voltage range is 3.3V~5V
Action Fail	Failed to perform action
Out of Limit	Burning Quantity Exceeded
Blank Check Fail	Blank check failed
Erase Fail	Erase failed
Write Fail	write failed
Verify Fail	verification failed
OCD Password Error	OCD password error

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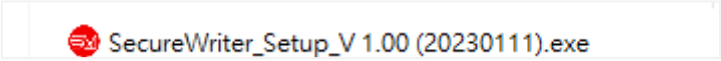
5. Software installation

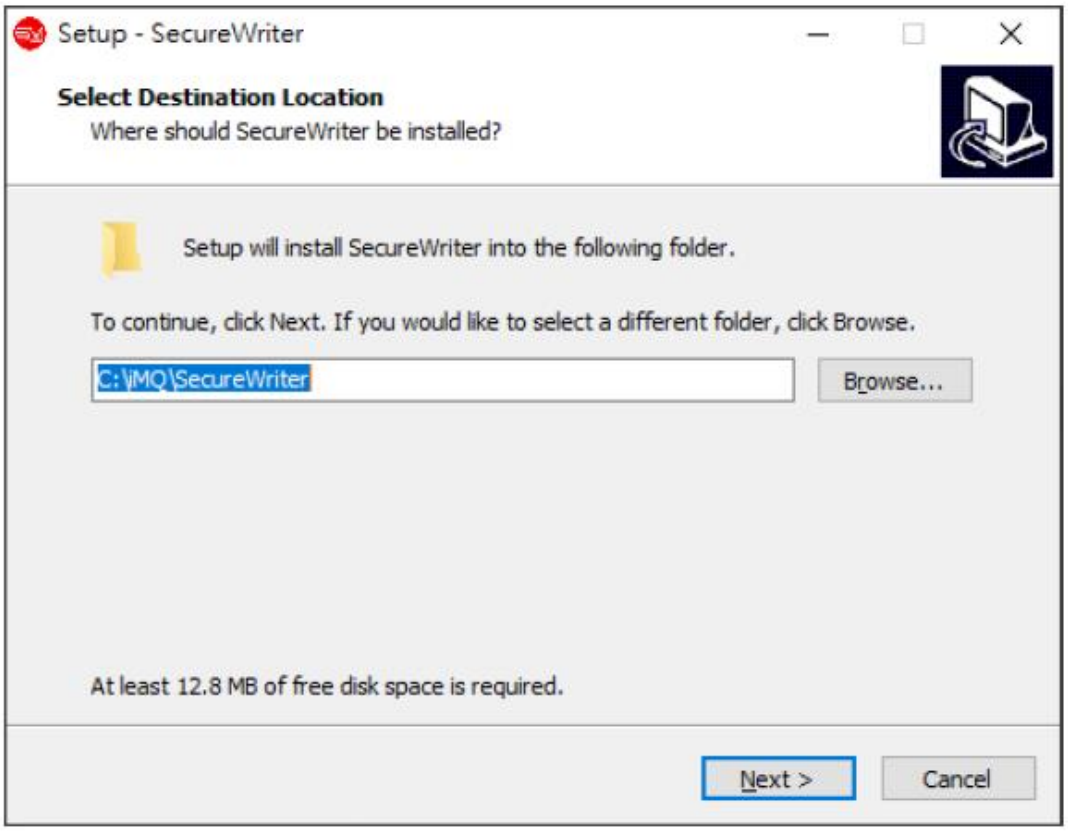
5.1 Procedure of Install

Step 1. Double-click SecureWriter_Setup.exe to execute the installation program



Take SecureWriter_Setup_V1.0 as an example

Step 2. Set the installation path. The default path is C:\SecureWriter. If there is a previously installed version in this path, it will not ask the path again.



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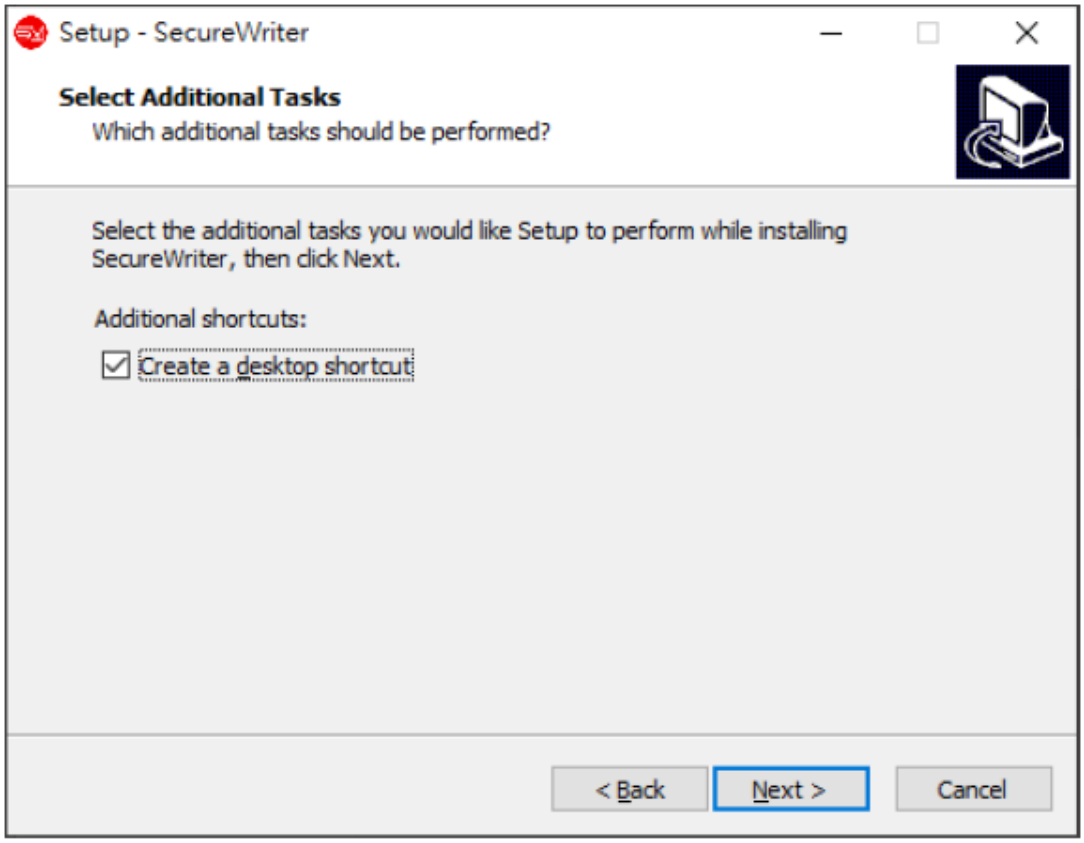
Step 3. After choosing whether to create a shortcut icon on the desktop, press "Next".



Step 4. Press "Finish" button to complete the installation.

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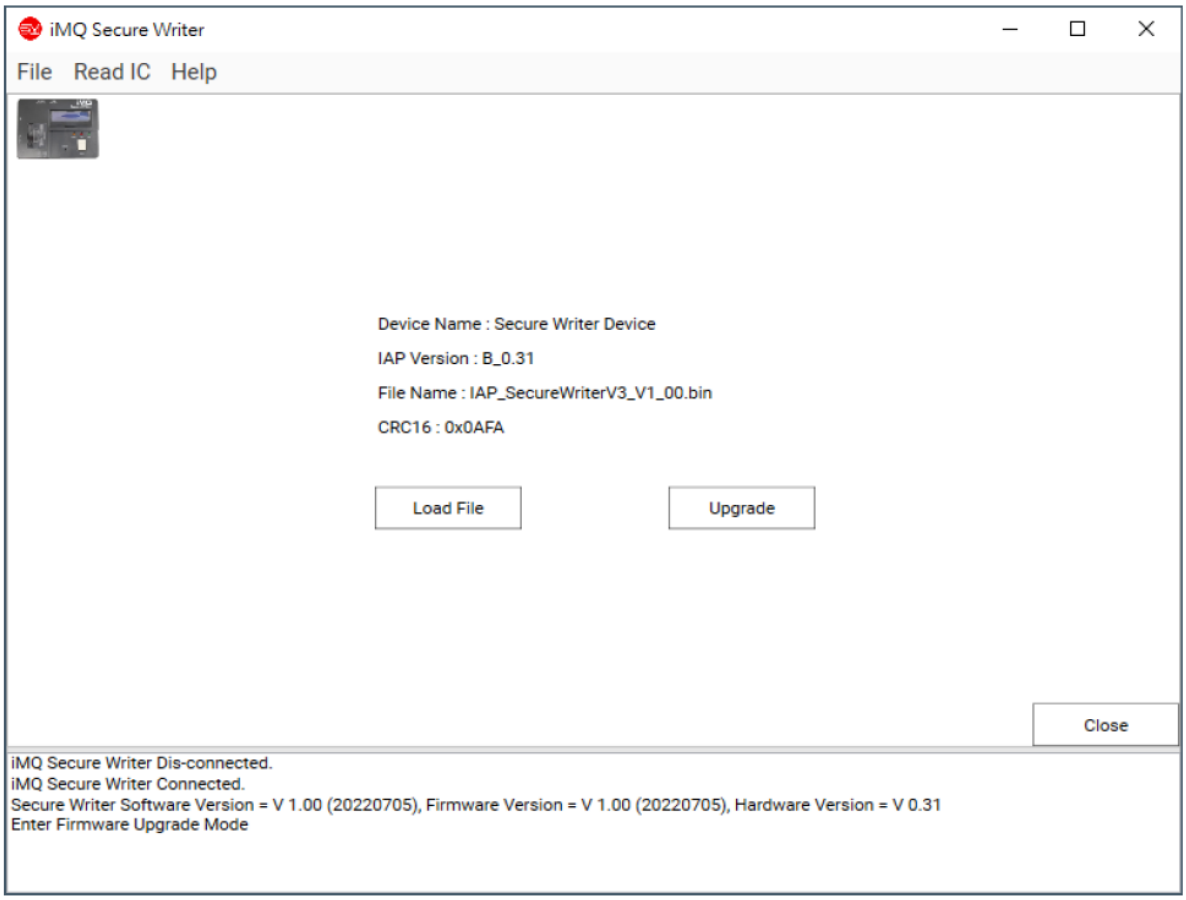
5.2 Secure Writer Firmware Upgrade

Click Help / Secure Writer Firmware Upgrade, to upgrade the firmware



This function will update the firmware of the Secure Writer machine. The updated file and whole transmission process are in encryption. The update steps are as follows:

1. Click Help / Secure Writer Firmware Upgrade
2. The Secure Writer enters the firmware upgrade mode:
   Hold down the Start Button continuously, then **plugin power cable** or reset the machine until yellow light is on. After successfully entering upgrade mode you may release the Start Button, and software screen will display "Enter Firmware Upgrade Mode" message
3. Load File:
   Load the firmware file to upgrade. Software will check the file format and version. If the format is wrong or the version is older than the current version, it will not load file successfully.
4. Upgrade:
   After load file successfully, the file name and CRC16 will be display on the top of the screen. Confirming whether it is correct, then click the Upgrade button to update

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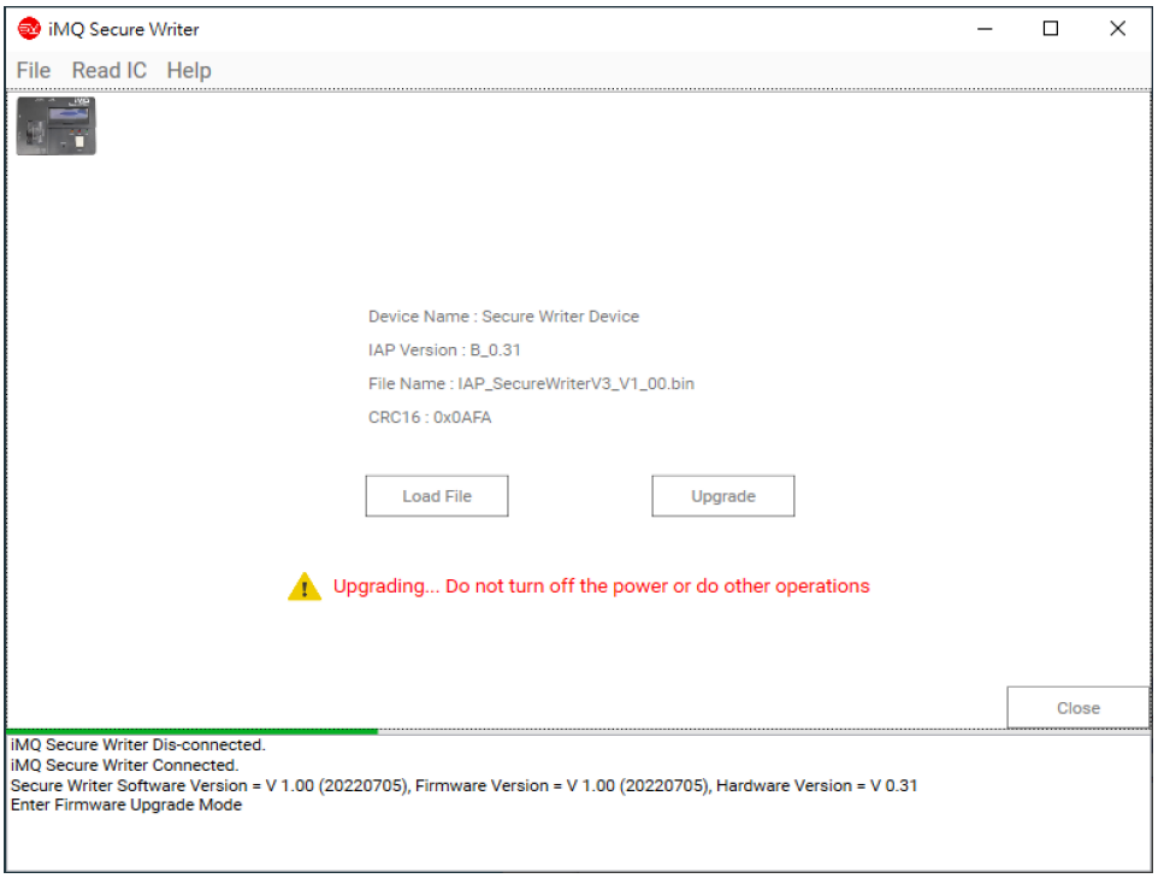
firmware. During the update process, please do not turn off the power or do other operations that will affect the update. Wait until the update is complete, Secure Writer will reset automatically.



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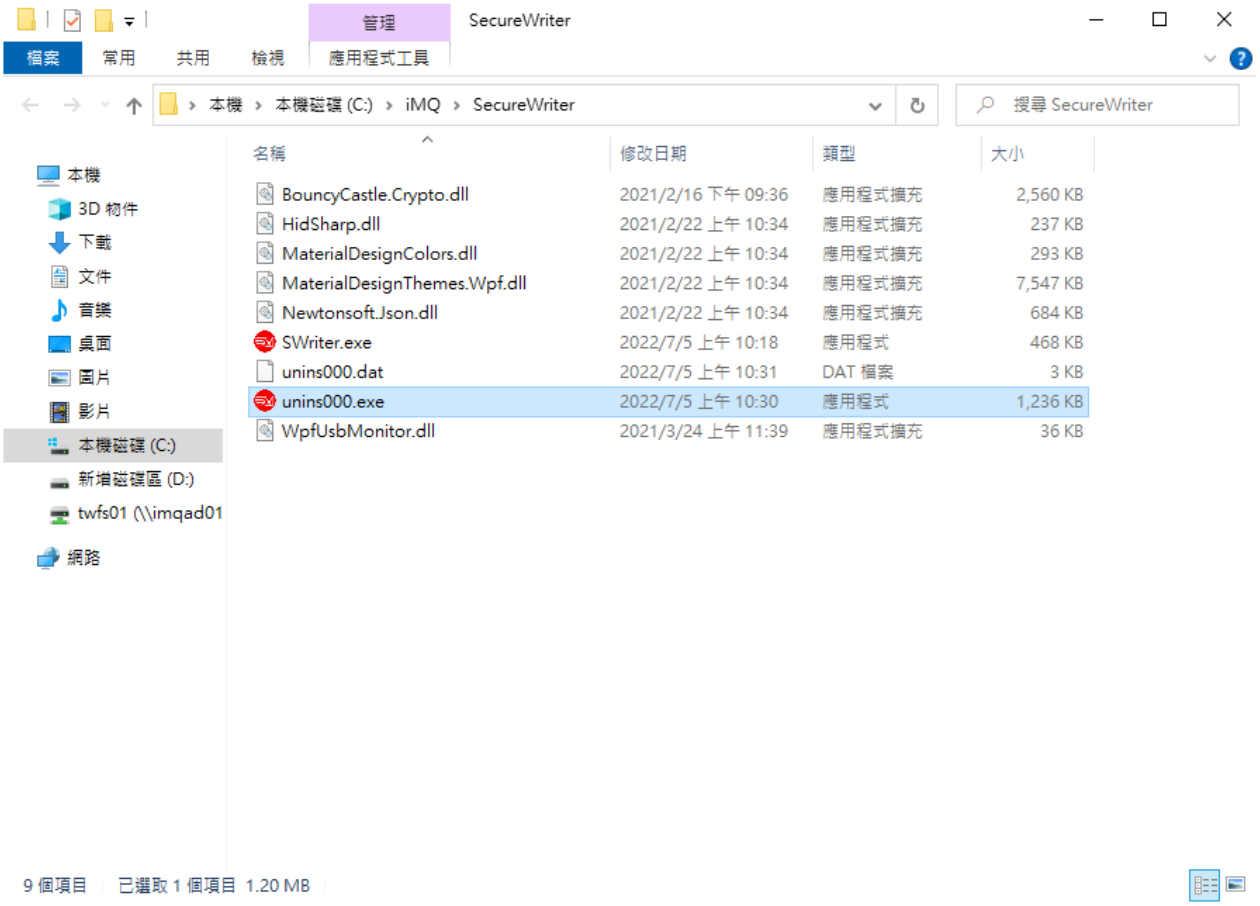
5.3 Software Uninstall

In the installation directory, you can find the removal program “unins000.exe”, and execute it directly to remove the Secure Writer software.



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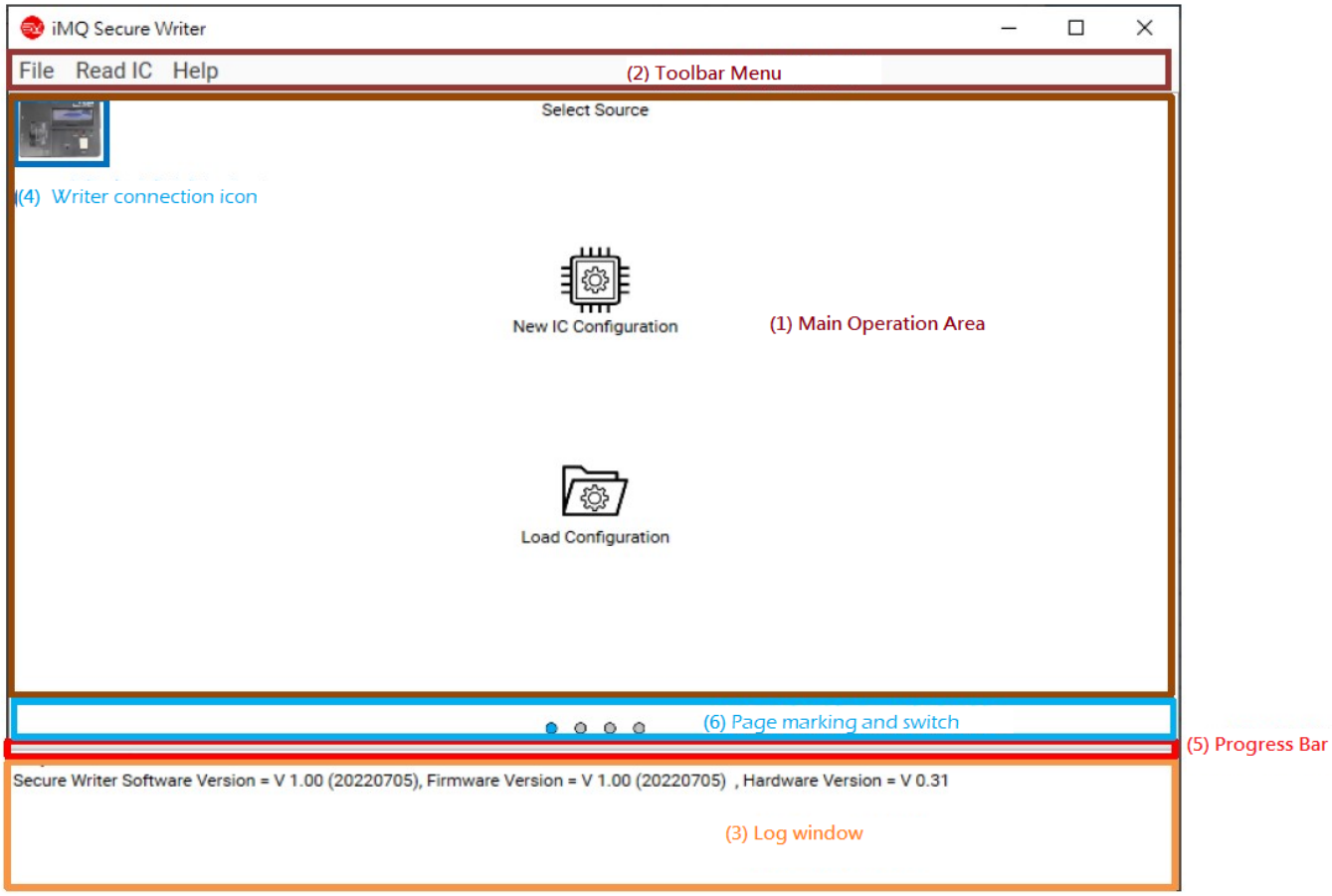
6. Function Description

6.1 User Interface description

The software operation interface divided into the following parts:

(1) **Main operation area:** Main screen presentation, related settings, and functional operations.
(2) **Toolbar menu**: Provide File, Read IC, Help menu
(3) **Log window:** All related logs of the operation message will be display here.
(4) **Writer connection icon:** When the software detect the Secure Writer connected, this icon will be display.
(5) **Progress bar:** When executing some time- consuming actions, the progress bar will display the progress of the action.
(6) **Page marking and switch:** The middle dot marks the current page position, the left arrow can switch back to the previous page, and the right arrow can switch to the next page.



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6.2 IC configuration and programming function

In order to make the programming process more conveniently and completely, 4 guiding pages are used for user. After the user completing the settings of each page sequentially, you can switch to the next page for series of settings, and finally going to the Programming page. It means that the setting is completed, and you can directly perform programming or other actions.

Page 1– **Select Source:** Select the source of IC configuration
Page 2– **IC Configuration:** select the IC to be programmed and set the configuration of the IC
Page 3– **Writer Option:** Select the settings for Secure Writer burning
Page 4– **Programming:** perform programming or other actions

The functions and options of each page, we describe in detail below:

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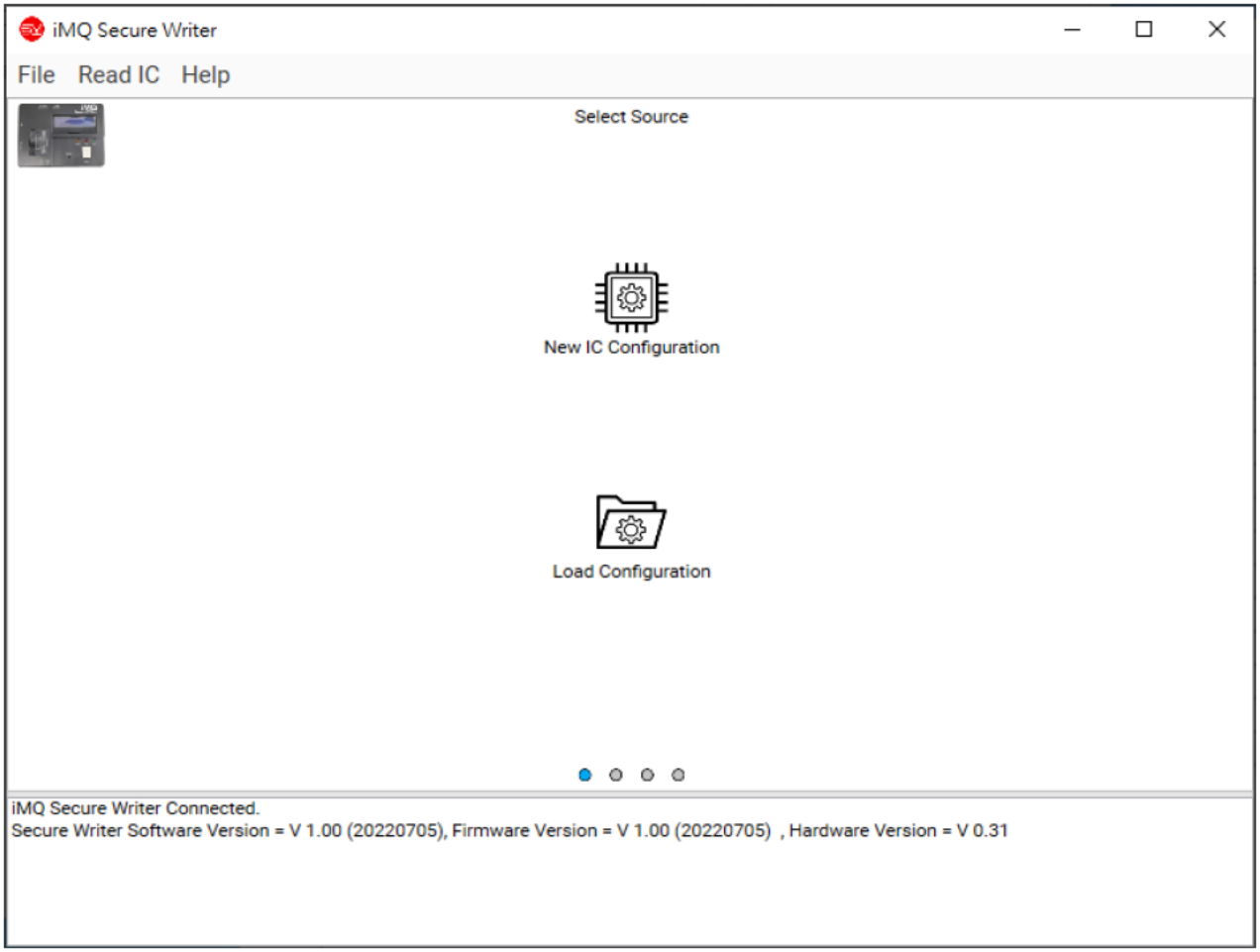
6.2.1 Select Source Page

Select source for IC configuration



- New IC Configuration：

  The function is the same as File/New to create a new IC configuration, and jump to the IC Configuration page for series of settings (refer to 6.2.2 IC Configuration, 6.2.3 Writer Option, 6.2.4 Programming for details).

- Load Configuration：

  The function is the same as File/Load File. It can load the IC configuration file that has been set and saved with New IC Configuration, so that you can use the verified setting items; or you can jump to IC according to the difference in the loaded file content. On the Configuration page or Programming page, make minor modifications later, and then Programming IC (refer to 6.3 File function for details).

6.2.2 IC Configuration Page

(1) Secure ASIC (SQ7101/SQ7103/SQ7131/SQ7133/SQ7135)：

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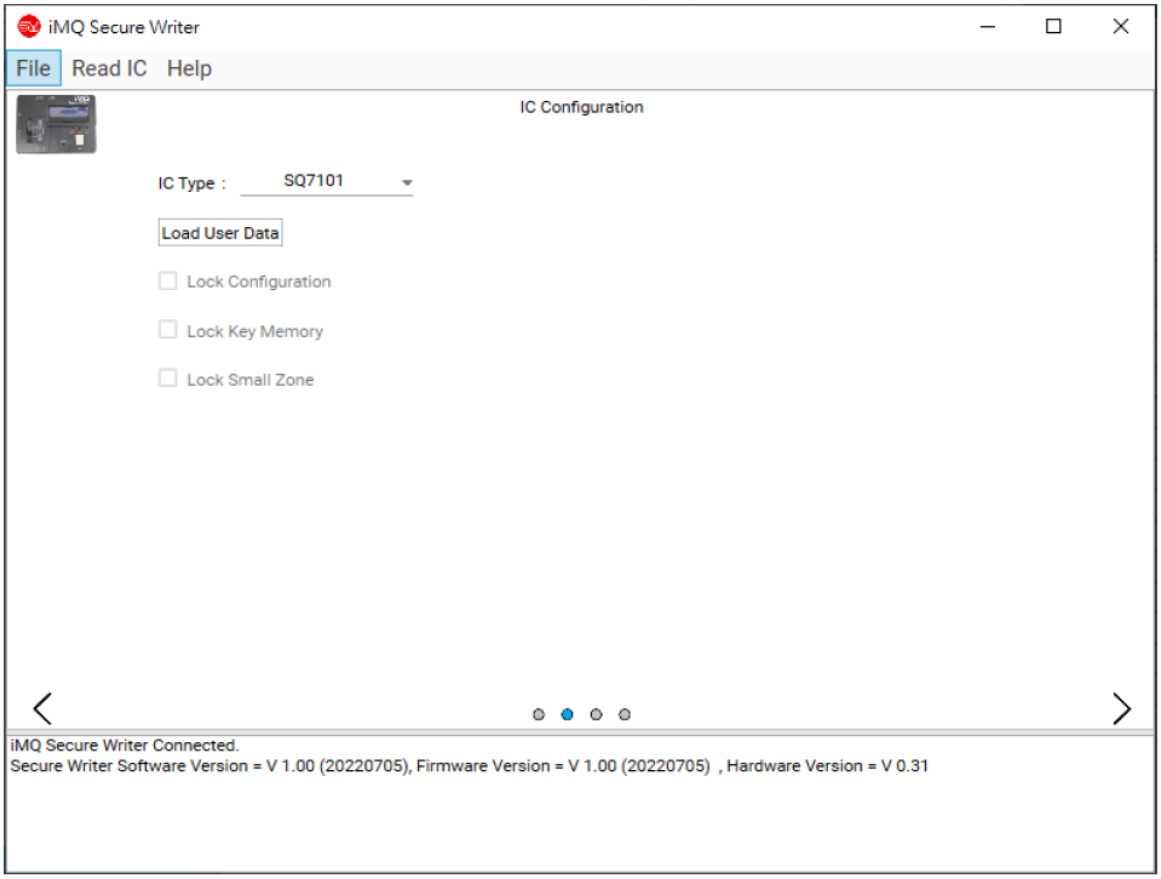
- **Load User Data**(*) : Load the User Data File to be programmed.
- **Lock Configuration:** If checking this item, the action of Lock Configuration will execute during programming.
- **Lock Key Memory:** If checking this item, the action of Lock Key Memory will execute during programming.
- **Lock Small Zone:** If checking this item, the action of Lock Small Zone will execute during programming.

* : The User Data File for SQ710x/SQ713x is generated by the Tool/Program Device page from iMQ Secure Starter-Kit program.



(2) SQ general-purpose MCU (SQ7613/SQ7615/SQ7617/SQ7653) :

- **Load FW File:** Load the FW File to program. (*1)
- **Load User Data:** Load the User Data File to be programmed.(*2)
- **OCD Permanent Disable:** If checking this option, the OCD channel will be permanently closed after programming the IC
- **OCD Password:** If checking this option, you can set the OCD password, the password must be hexadecimal and the length is 32 characters.

*1: The FW File for SQ general-purpose MCU generated by iMQ i87-IDE program. (MQ-Link)

*2: User Data File for SQ general-purpose MCU edited by user. At present, only SQ7617/SQ7653 has EEPROM in SQ general-purpose MCU.

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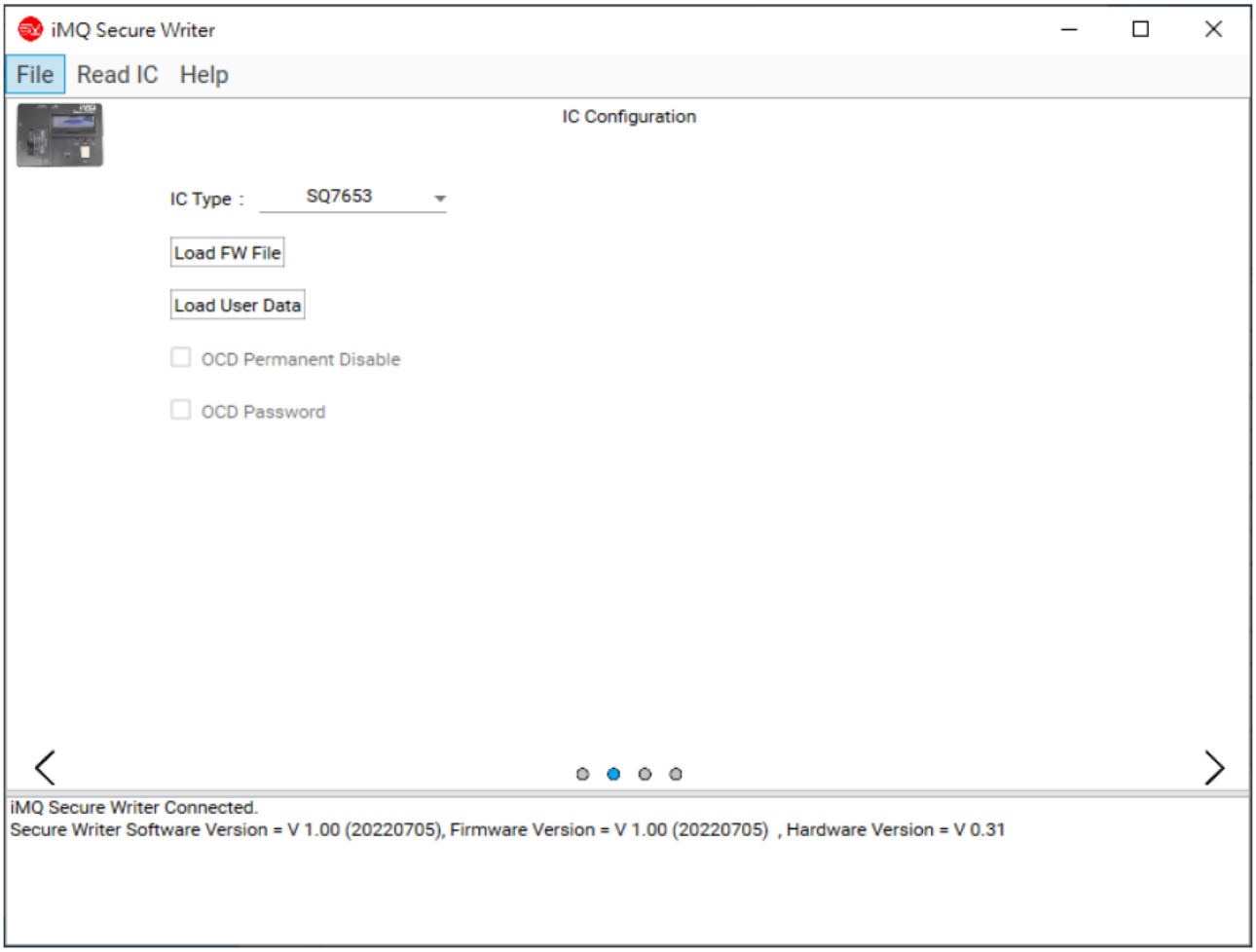

(3) MCU with Security Processor (e.g. SQ7515)

- **Load FW File:** Load the FW File to program. (*1)
- **Load User Data:** Load the User Data File to be programmed.(*2)
- **OCD Permanent Disable:** If checking this option, the OCD channel will permanently closed after programming the IC.
- **OCD Password:** If checking this option, you can set the OCD password, the password must be hexadecimal and the length is 32 characters.
- **Lock Configuration:** If checking this item, the action of Lock Configuration will execute during programming.
- **Lock Key Memory:** If checking this item, the action of Lock Key Memory will execute during programming.
- **Lock Small Zone:** If checking this item, the action of Lock Small Zone will execute during programming.

*1: The FW File for MCU with Security Processor generated by iMQ i87-IDE program. (MQ-Link)
*2: User Data File for MCU with Security Processor edited by user. (Refer to SQ7515 specifications to develop hardware related settings).

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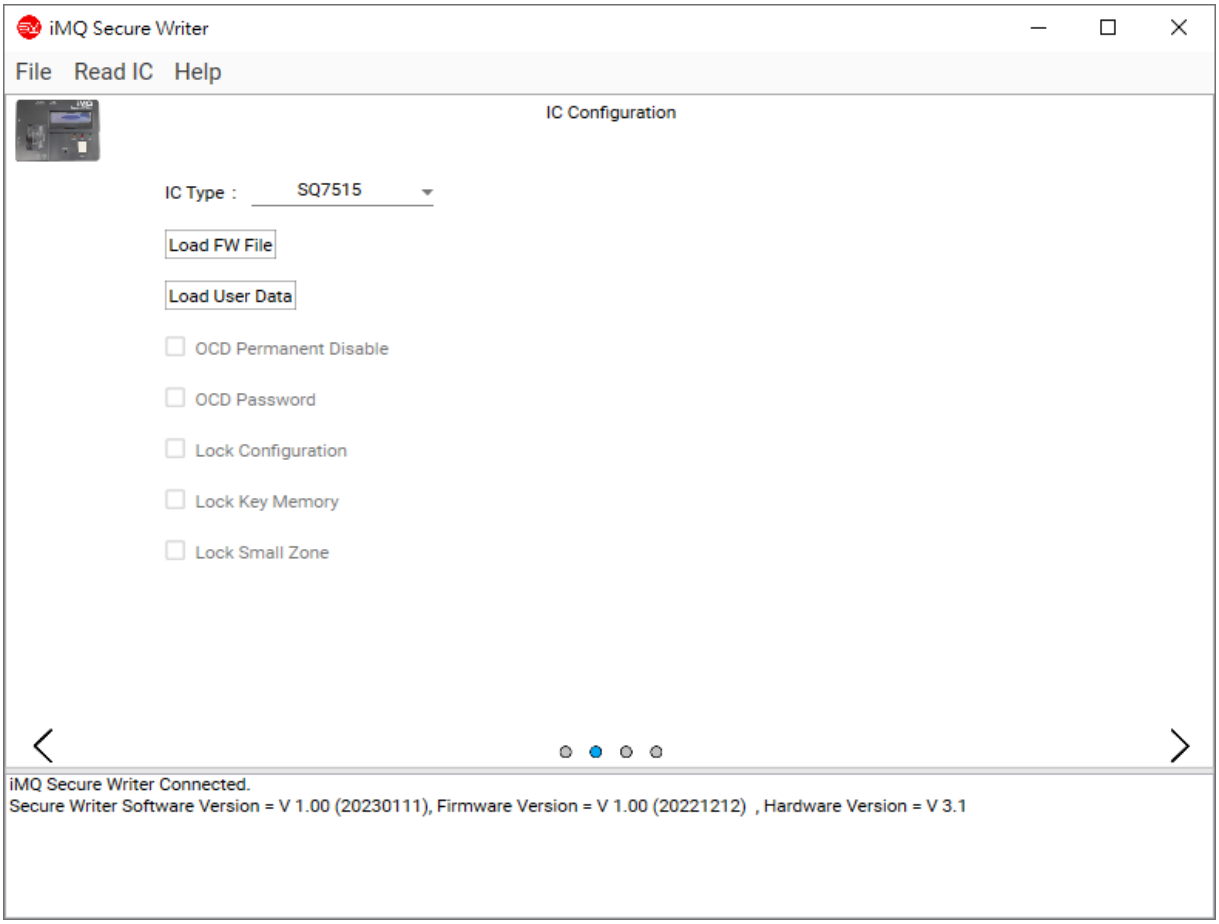

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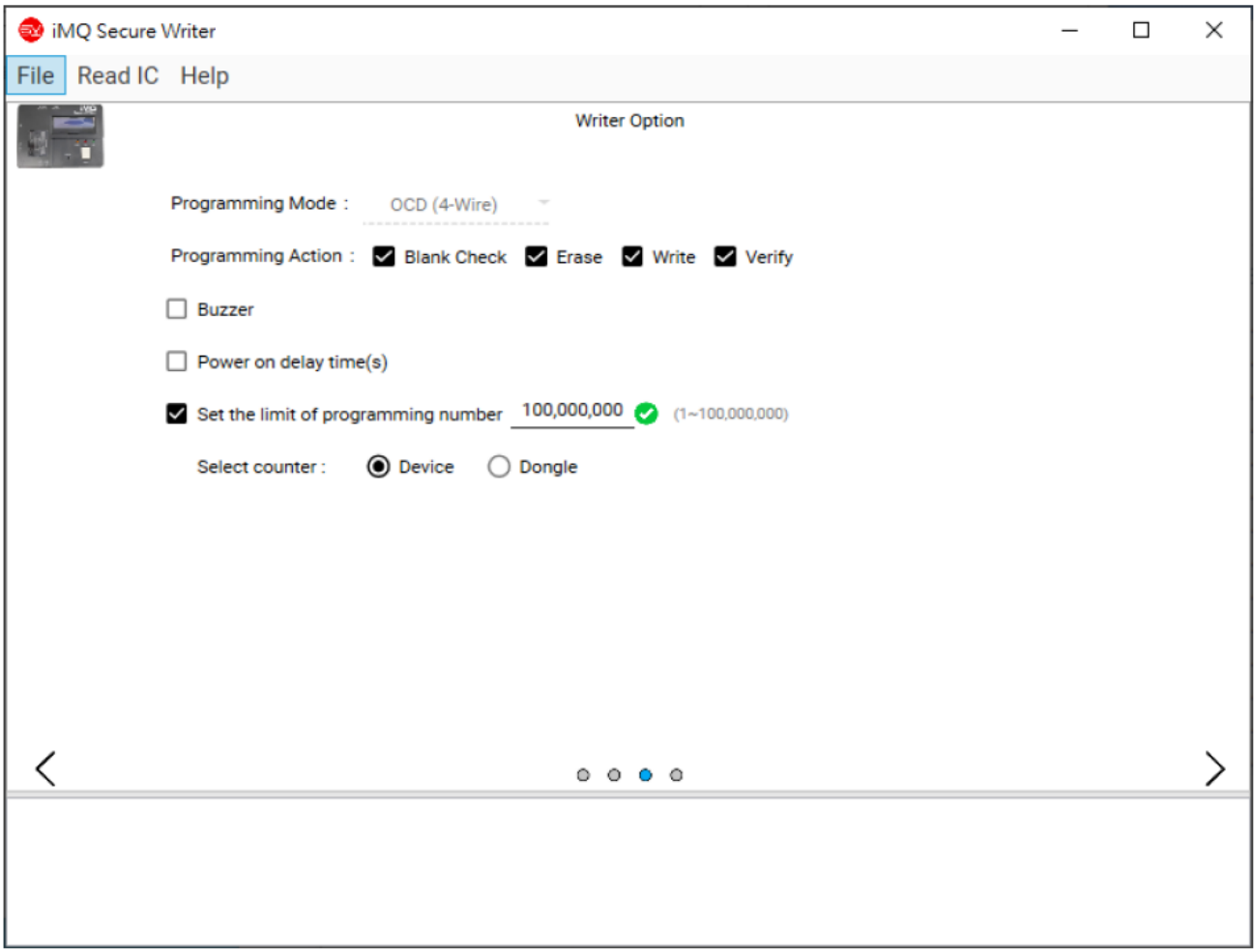
6.2.3 Writer Option Page

Select writer operation settings



- **Programming Mode:** The option is only available when programming the MCU. Select the mode for programming (currently only Support OCD-4Wire).
- **Programming Action:** The option is only available when programming the MCU. Selected actions will be performed during programming process (the description of actions are described in the Programming page below).
- **Buzzer:** If checking the option, the Buzzer will make a sound after some actions in Secure Writer.
- **Power on delay time(s):** Set the time in seconds for Secure Writer to delay programming, and the range is 0.01 ~ 10.00 Sec.
- **Set the limit of programming number:** If checked, you can set the number of programming ICs. The range can be set from 1 to 100,000,000, and you can choose to use Device or Dongle to control the numbers; if you don't check it, there is no operation quantity limit.

Note: The Dongle option of Select Counter is not supported now, it is reserved for future development.

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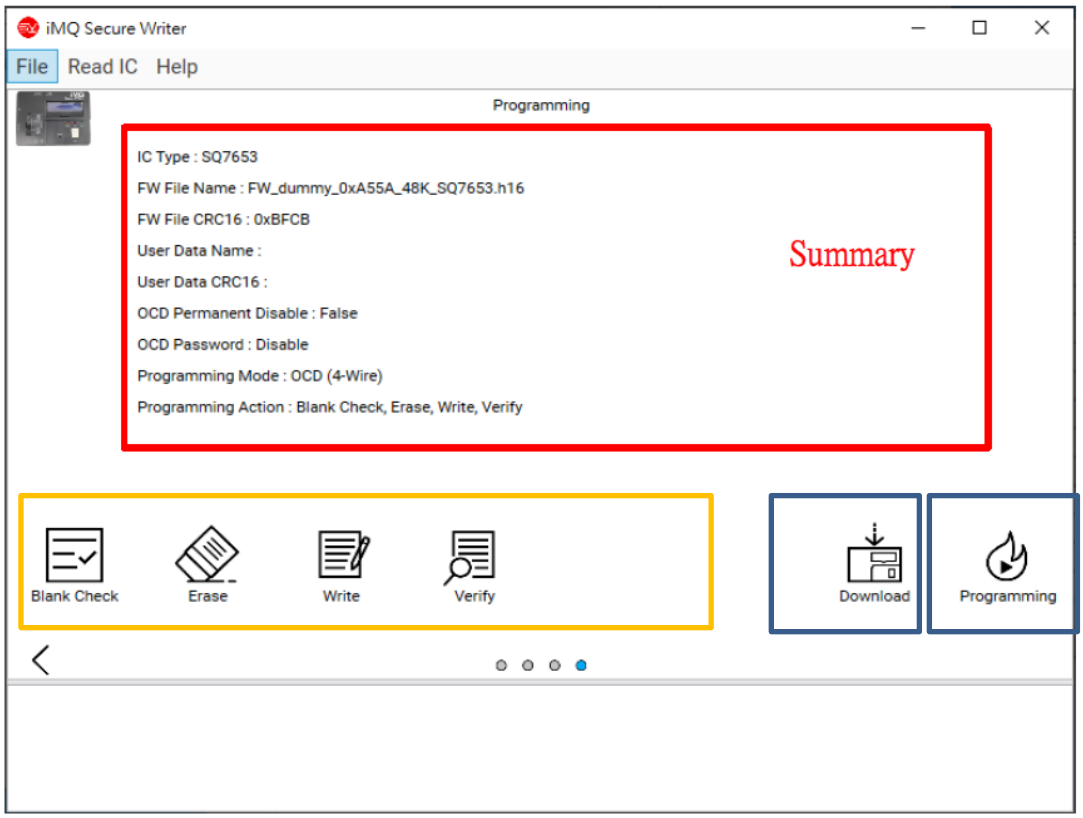
6.2.4 Programming Page

Arriving at this page indicates that the IC configuration and Writer settings have completed, and other actions such as download or programming can perform.



- **Summary:** The area display summary of the current IC programming configuration and Writer settings.
- **Download:** The button is to transfer the IC configurations and Writer settings to the Secure Writer machine.
- **Programming:** This button is to execute the programming actions. It will execute the programming steps according to the options "Erase", "Blank Check", "Write" and "Verify" checked on the Writer Option page. To execute this action, you need to execute Download before.
- **Action:** (These buttons can only use in MCU operation. The action will be executed separately, and Download must be done before performing these actions)
  - Blank Check: Check MCU Flash are blank (all are 0xFF) or not.
  - Erase: Erase data stored in MCU Flash
  - Write: This is to write the current IC configuration into the MCU (this action will fail when the Flash is not blank, we recommended to use "Blank Check" to check or "Erase" to clear the space)
  - Verify: This is to verify whether the content of the IC is consistent with the data of the Secure Writer machine after writing to IC.

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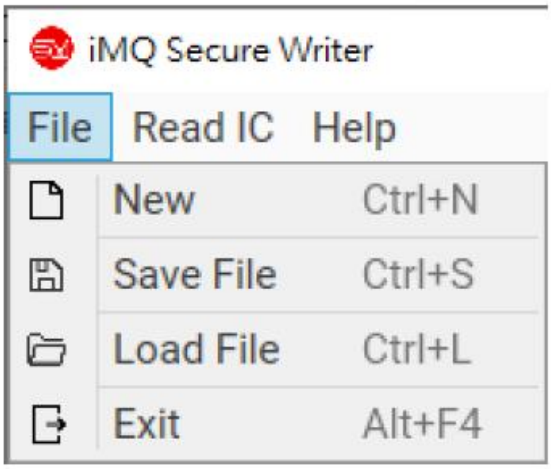
6.3 File Menu



- **New:** Create a new IC configuration, and jump to IC Configuration page, the function is the same as the New IC Configuration described in 6.2.1
- **Save File:** Use encryption to save current IC configurations and programming settings. If you have followed the steps 6.2.2~6.2.4, you can only use this function on the Programming page. Click and jump to the Save File Options screen for more detailed information:

  - Save Content:
    - ✓ Save All: All data will save.
    - ✓ Save Configuration: Save configuration setting. (without FW data and User Data File)
  - Permission:
    - ✓ Read/Write: Files saved with this permission can edit after user loads.
    - ✓ Read only: Files saved with this permission cannot be edited after the user loads.
  - Save Mode:
    - ✓ Normal mode: Use only basic encryption protection when saving files.
    - ✓ Protect mode: When saving a file, it will authenticate the Key with the Device or Dongle, and require the user to enter a set of Pin Code for encryption protection.
  - Key Source: (This option will only be available when Protect mode is selected)
    - ✓ Device: Select Device as the source of the authentication key, and then when the user loads the file, he must first connect to the same Device.

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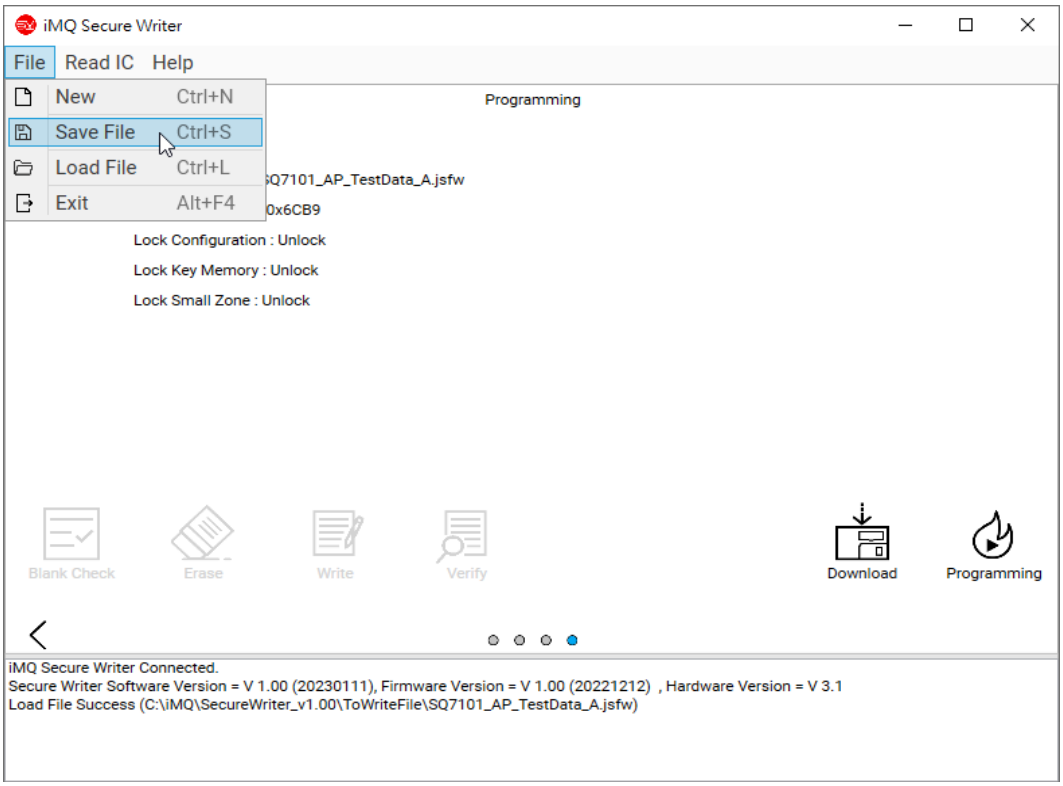
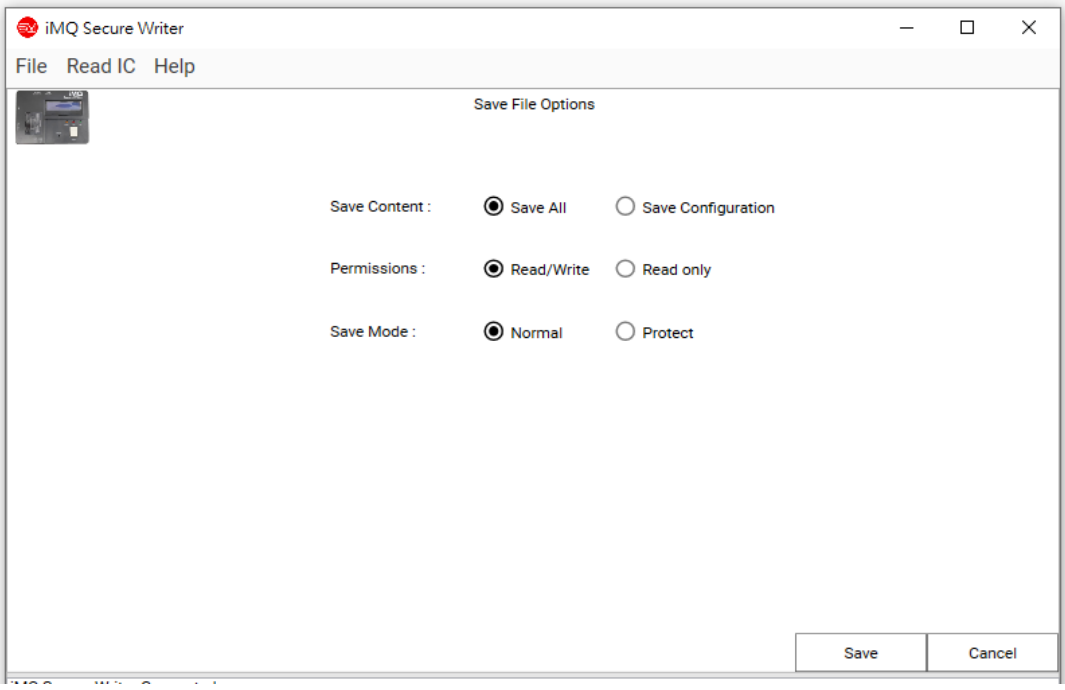


✓



- **Load File:** Read IC configuration and burn configuration files. The function is the same as the Load Configuration displayed when opening the software. After reading the file, it will have different behaviors according to the settings of the file that have been saved before. Please refer to the following instructions:

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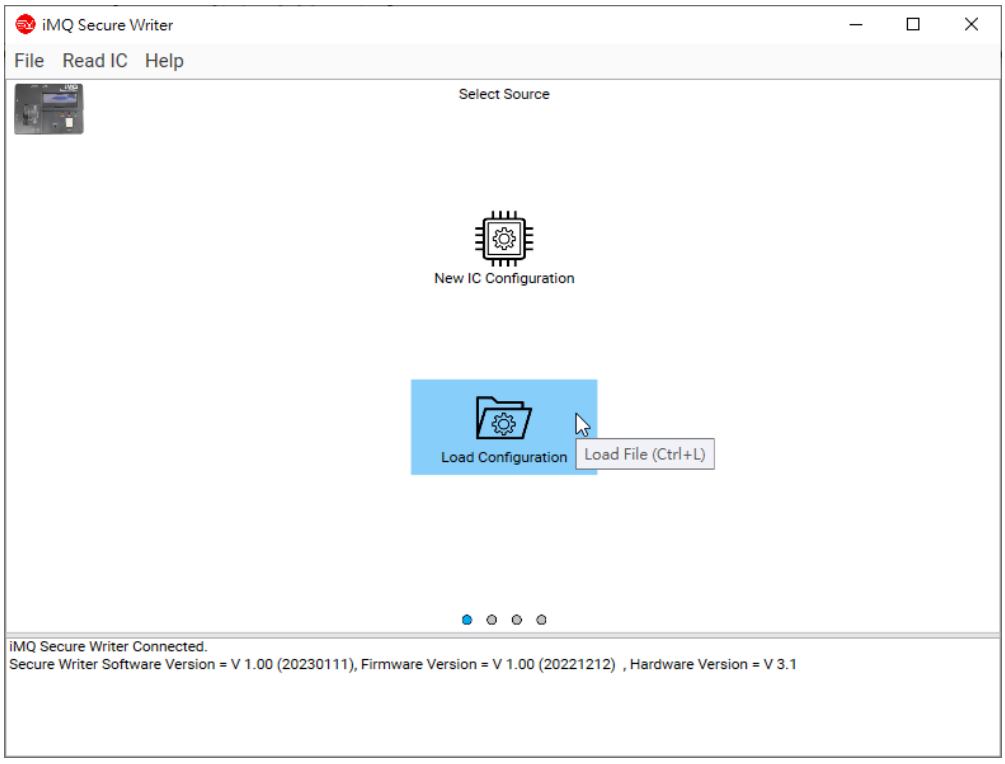

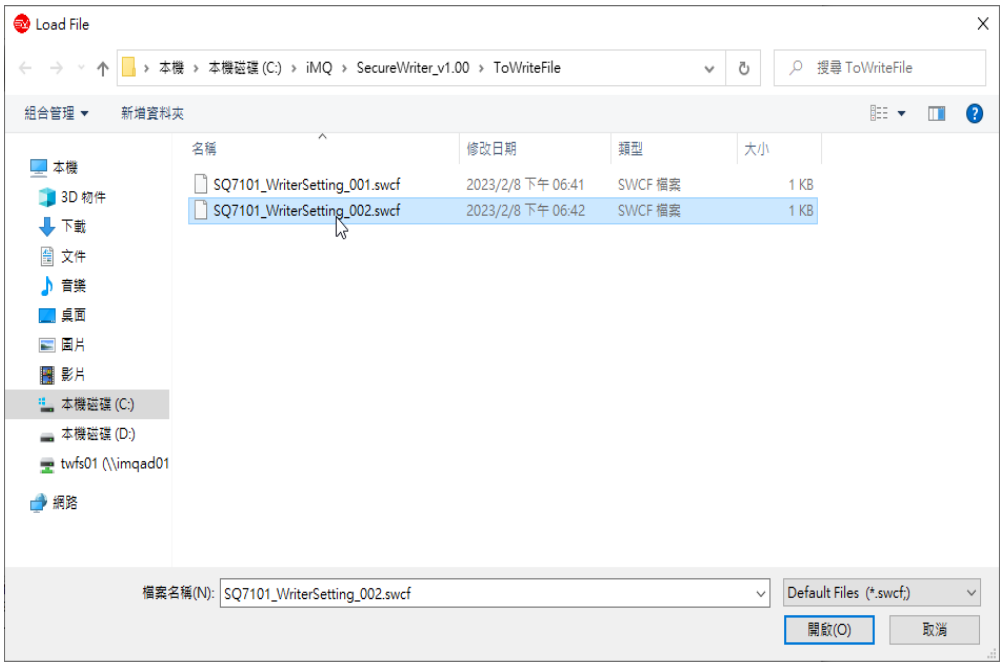

Select configuration file with the attached file name .swcf

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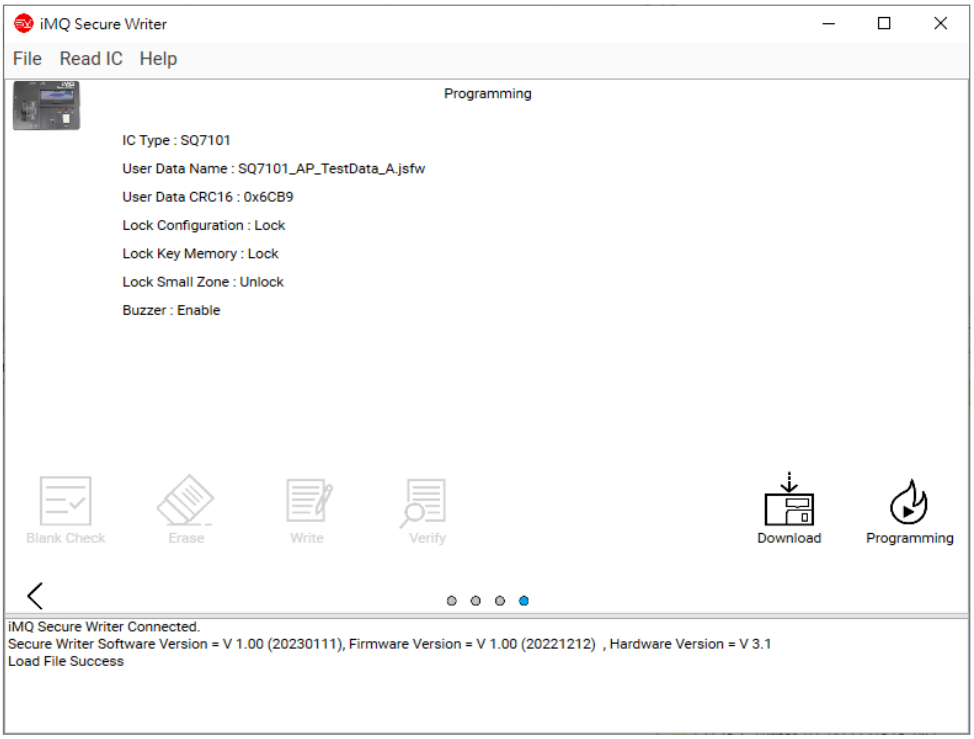

That is, you can load the programming files and options that have been set and saved before

- **Exit:** close the program.

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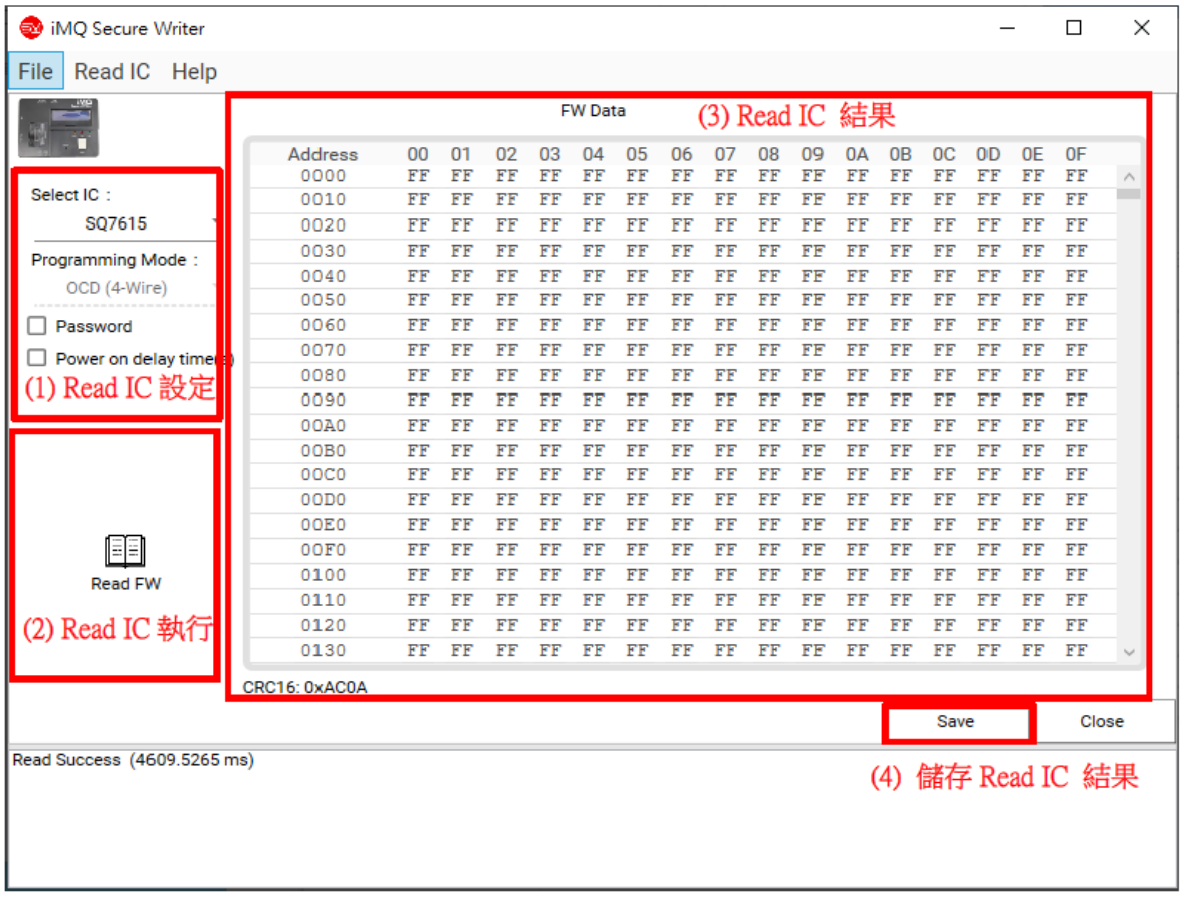
6.4 Read IC Menu

This function is to read the data in the MCU and display in the table for users to view. The related options are as follows:



(1) Read IC Setting:

- Select IC: Select the IC to be read
- Program Mode: Select the communication mode for reading (currently only Support OCD-4Wire)
- Password: Enter the password to read the IC, the password must be hexadecimal and the length is 32 characters
- Power on delay time(s): Set the time for Secure Writer to automatically delay reading, and the setting range is 0.01 ~ 10.00 Sec

(2) Read IC execution:

- Read FW: Start to execute the action of Read FW
- Read User Data: Start to execute the action of Read User Data (SQ7617/SQ7653 only have EEPROM)

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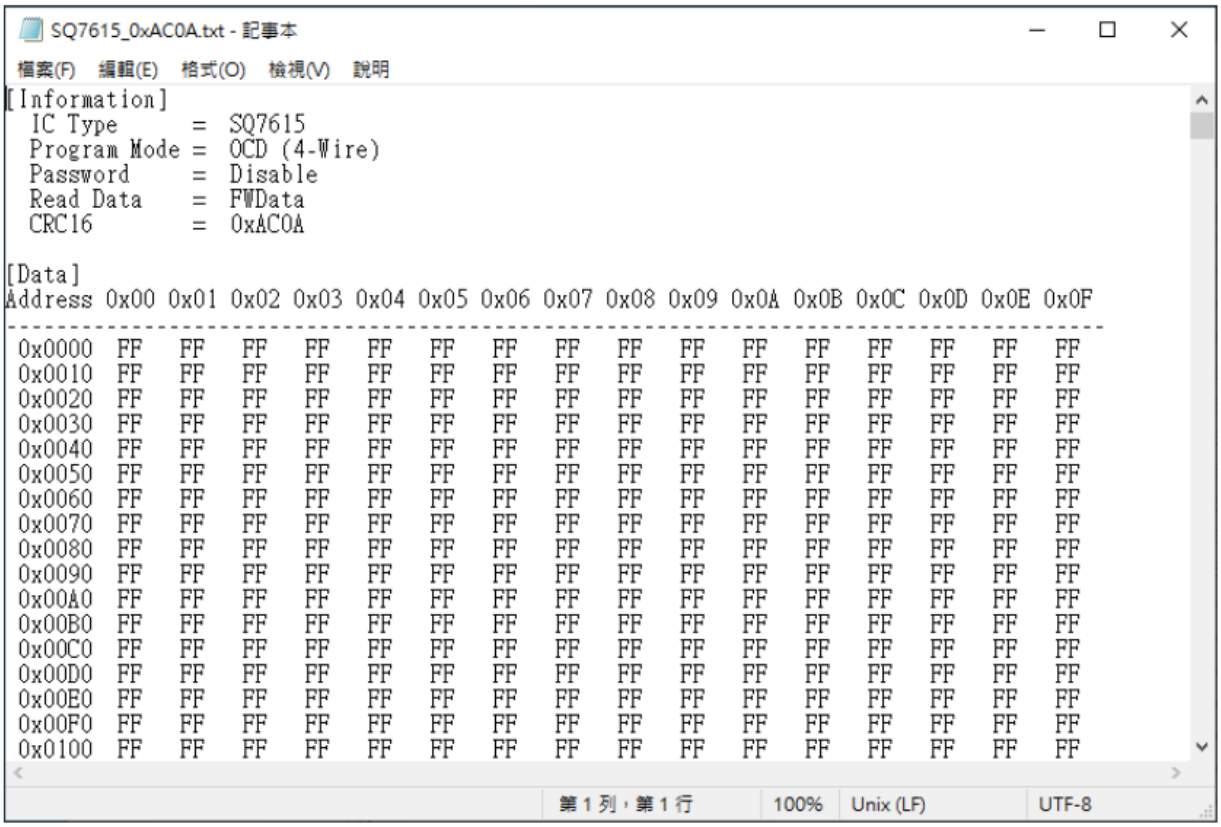
(3) Read IC result:

The result of Read IC is displayed on the table, and the CRC16 value of the result will be calculated in the lower left corner for user confirmation

(4) Store the Read IC result:

Save the result and related information of Read IC as a file. The default file name is "IC name_CRC16 value.txt" (this function will be displayed only after Read IC is successful). The content and format of the saved file are as following:



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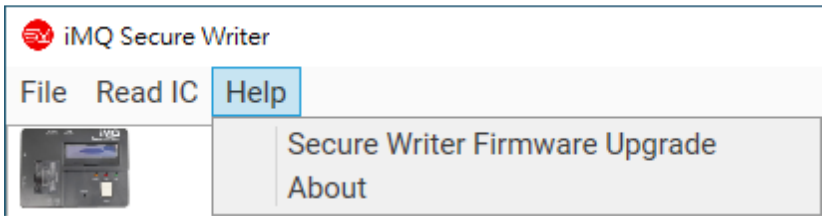
6.5 Help Menu

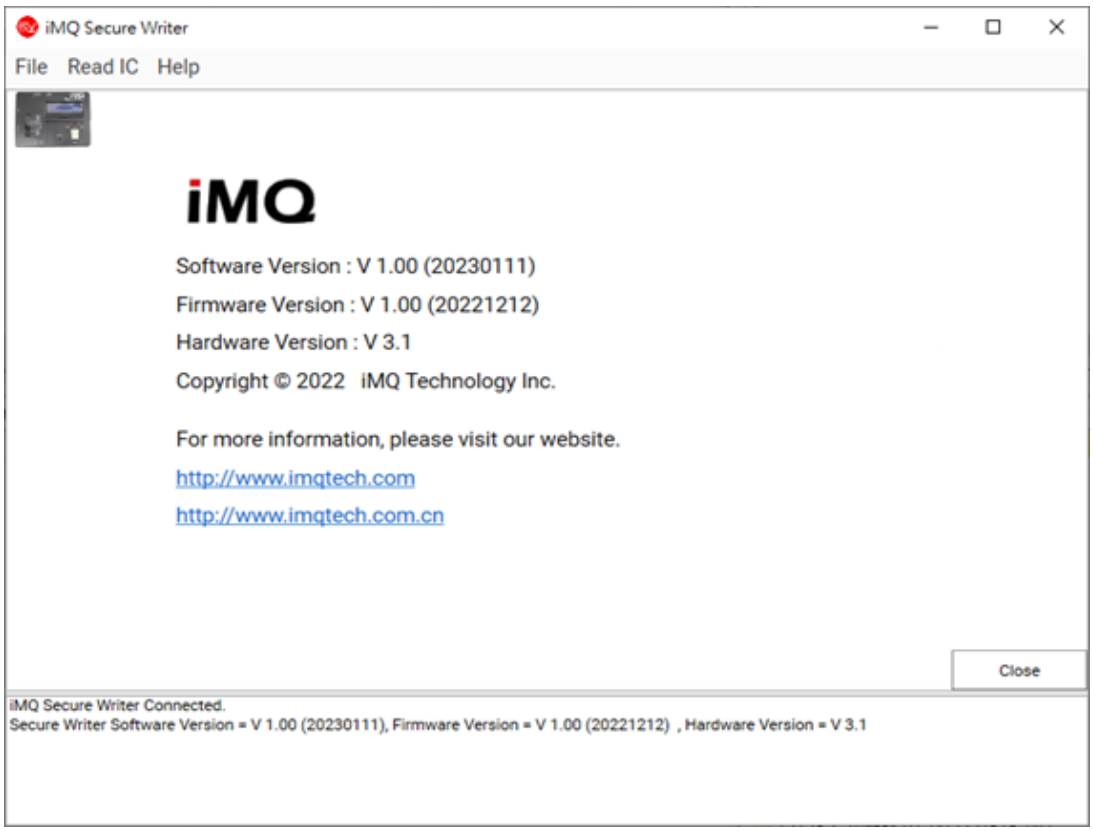


6.5.1 Secure Writer Firmware Upgrade

Click Help / Secure Writer Firmware Upgrade to update the firmware of the Secure Writer machine. For details, please refer to 5.2 Software Update (Secure Writer Firmware Upgrade).

6.5.2 About

Display the current software version, firmware version, hardware version and other related information.



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Change History

Version	Approved Date	Description
V1.3		Add SQ7133/SQ7135 programming
V1.2	2024/01/03	Add SQ7131 programming
V1.0	2023/05/10	First released

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