
OPTEEQ S1 In-system Programmer

# User's Manual

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v1.52 (updated in Aug 2024))

OPTEEQ
Technologies

Thank you for choosing OPTEEQ Technologies.

Before first use, please get acquainted with the software and hardware of this product and read this Manual carefully. This will help reduce accidents and avoid unnecessary losses.

The pictures hereof are all sample ones, and the specific product purchased by the user may be different from that described herein due to model, production batch, applicability and other reasons. OPTEEQ Technologies stays committed to manufacturing premium, efficient and fast products. We reserve the right to change the design, components and techniques at any time.

# Contents

# 1 Software Setup Process

## 1.1 Overview

This chapter mainly explains the setup process of the control software (hereinafter referred to as this software) of Series S in-system programmer.

## 1.2 Software Setup Steps

This software supports such windows operating systems as win7 (32/64 bit), win8 (32/64 bit , win10 (32/64 bit) and win(32/64 bit).

Notes: As for Win10 operating system, it is needed to disable the driver mandatory signature (also known as disabling digital signature) before software setup. Please search "How to disable the driver mandatory signature in Win10" through the browser.

After the digital signature is disabled, the signature will be enabled automatically when the computer restarts.

The setup steps of this software are detailed as follows:

Please read files in the USB flash disk provided by the Company first, and then double-click the setup program folder to access a setup package.

Step 1: Double-click the "setup package", as shown in Figure 1.1.


Figure 1.1: Step 1 - Double-click the setup package interface

Step 2: Language selection interface, Chinese by default. Click "OK", as shown in Figure 1.2.

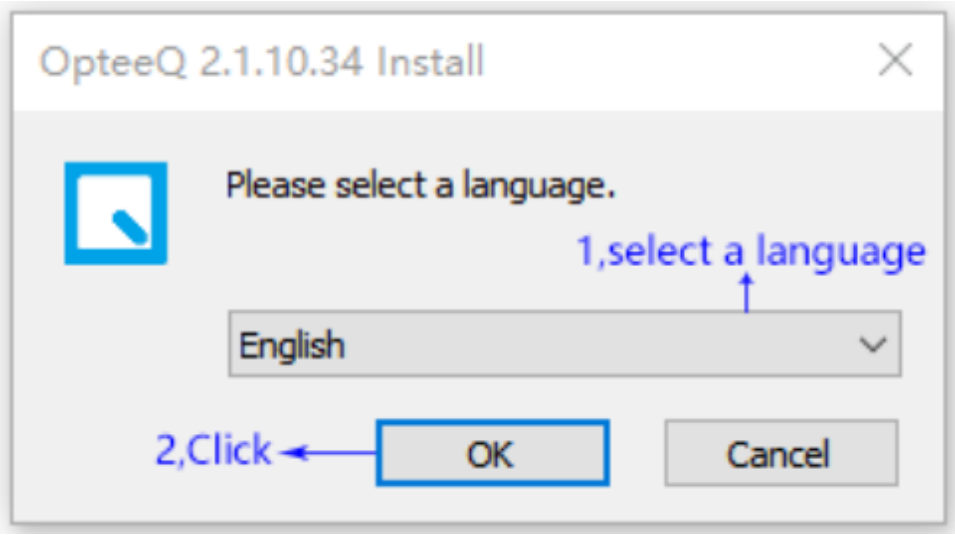



Figure 1.2: Step 2

Step 3: Click "Next" in the pop-up interface, as shown in Figure 1.3.


Figure 1.3: Step 3

Step 4: Click "Next" in the pop-up interface, as shown in Figure 1.4.

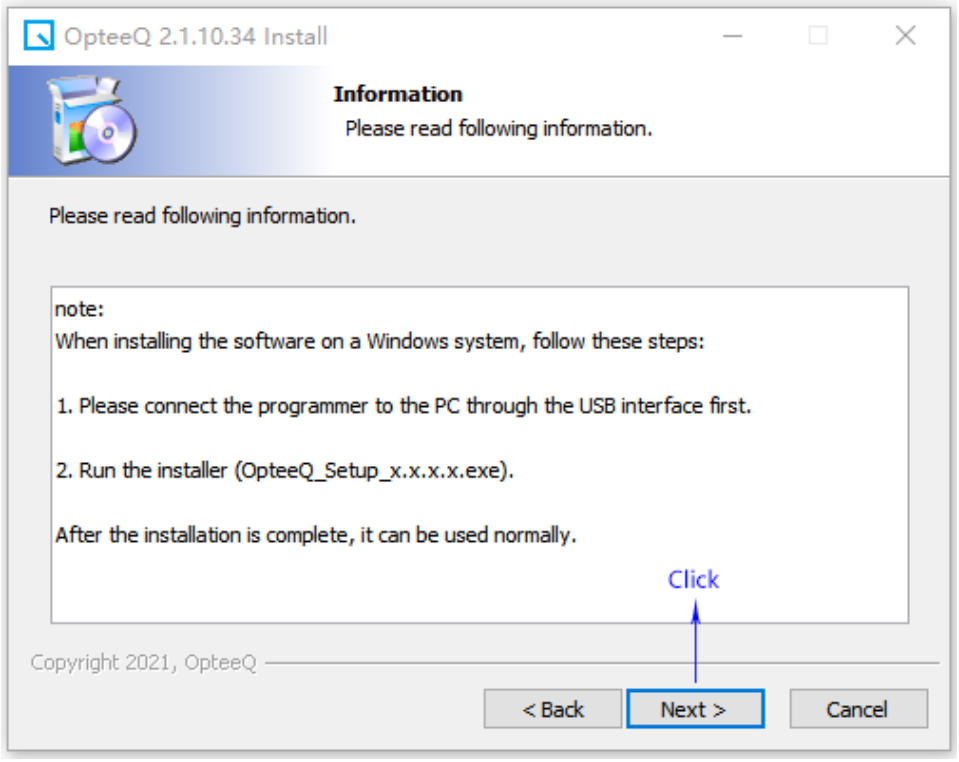



Figure 1.4: Step 4

Step 5: It is available to customize the setup path in the pop-up interface. Click "Next", as shown in Figure 1.5.

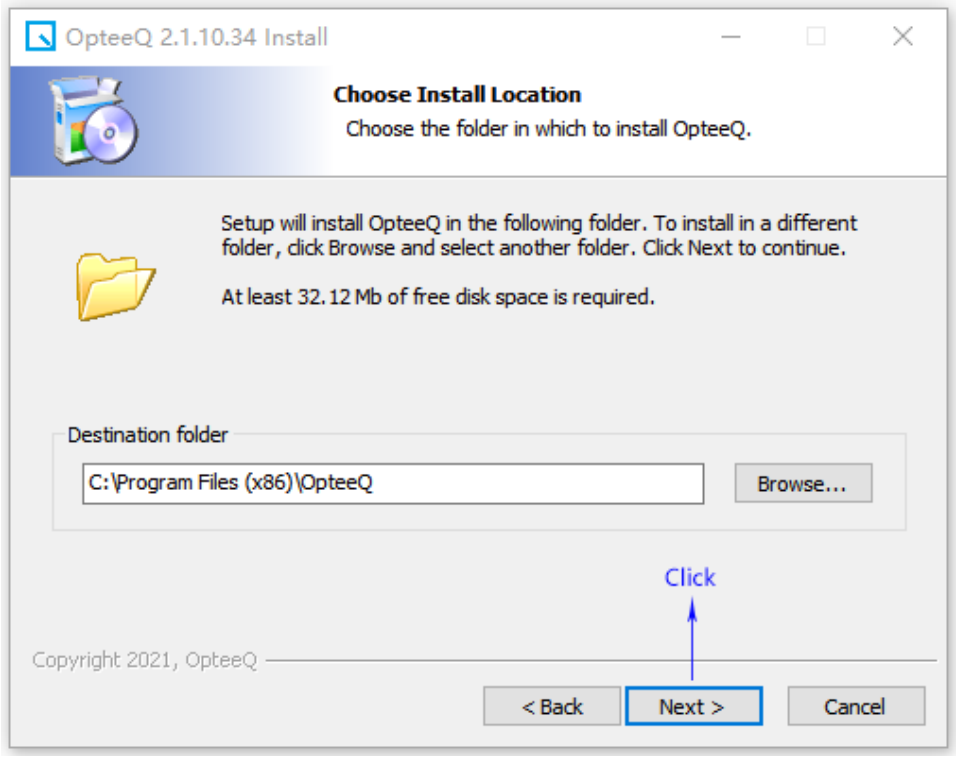



Figure 1.5: Step 5

Step 6: Click "Next" in the pop-up interface, as shown in Figure 1.6.

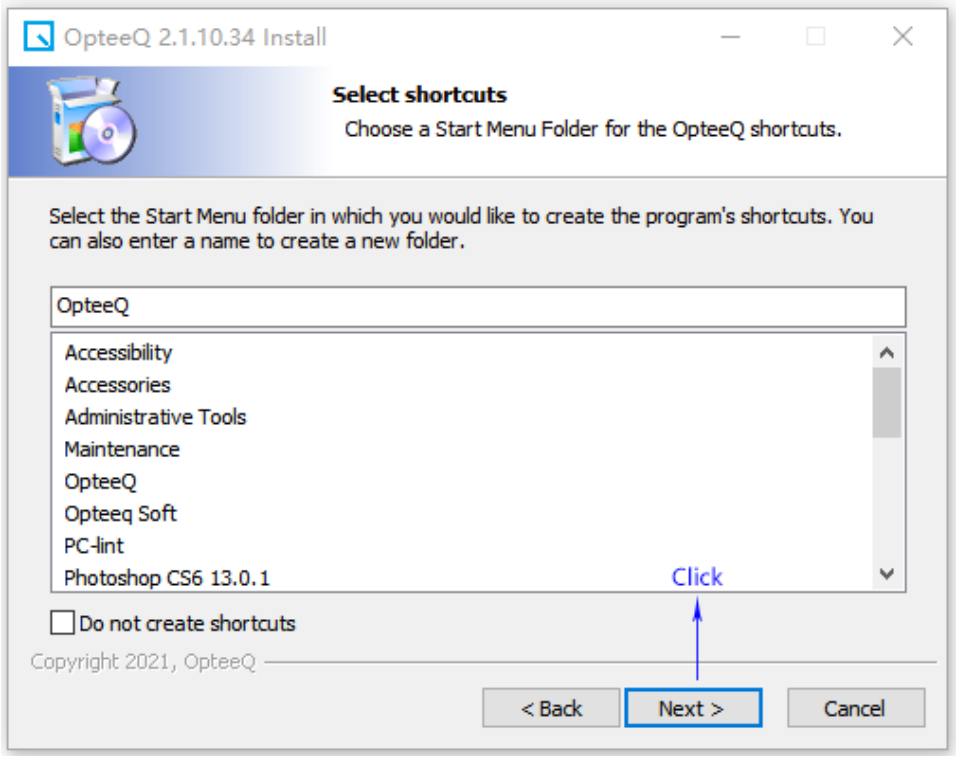



Figure 1.6: Step 6

Step 7: Click "Next" in the pop-up interface, as shown in Figure 1.7.

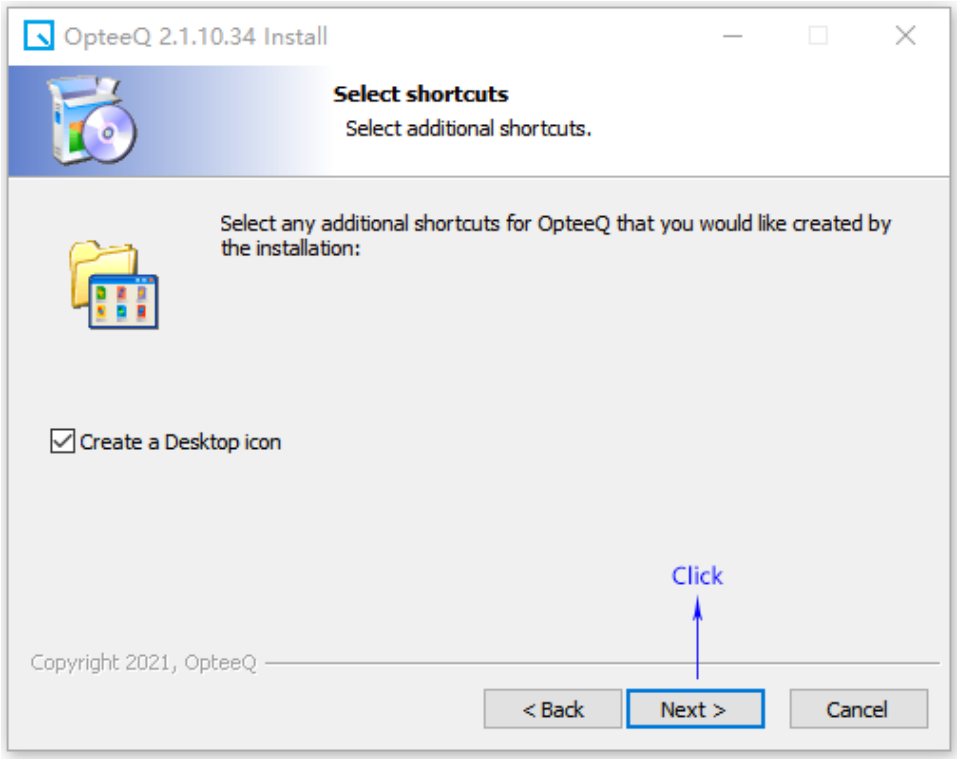



Figure 1.7: Step 7

Step 8: Click "Install" in the pop-up interface, as shown in Figure 1.8.

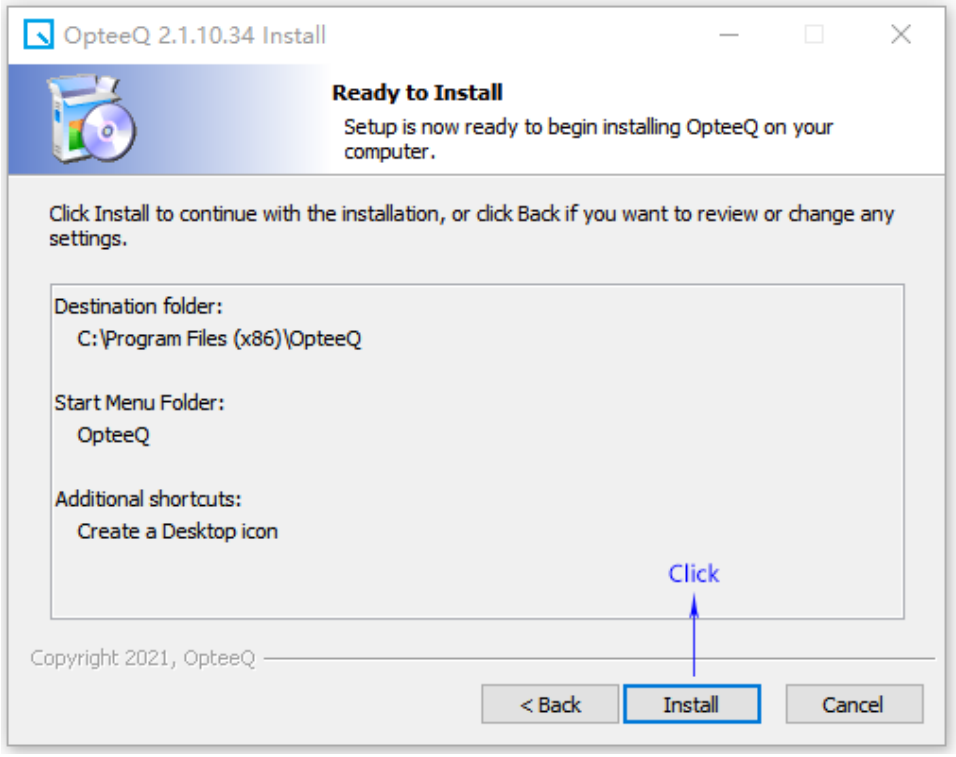



Figure 1.8: Step 8

Step 9: Click "OK" in the pop-up interface, as shown in Figure 1.9.

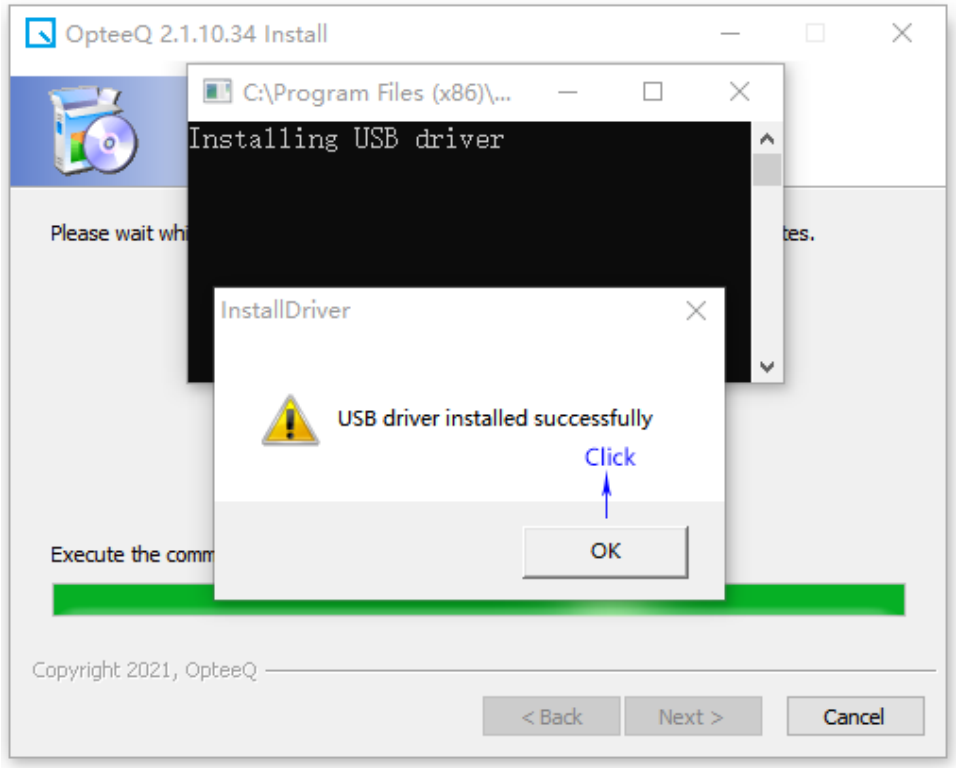



Figure 1.9: Step 9

Step 10: Click "Finish" in the pop-up interface, as shown in Figure 1.10.

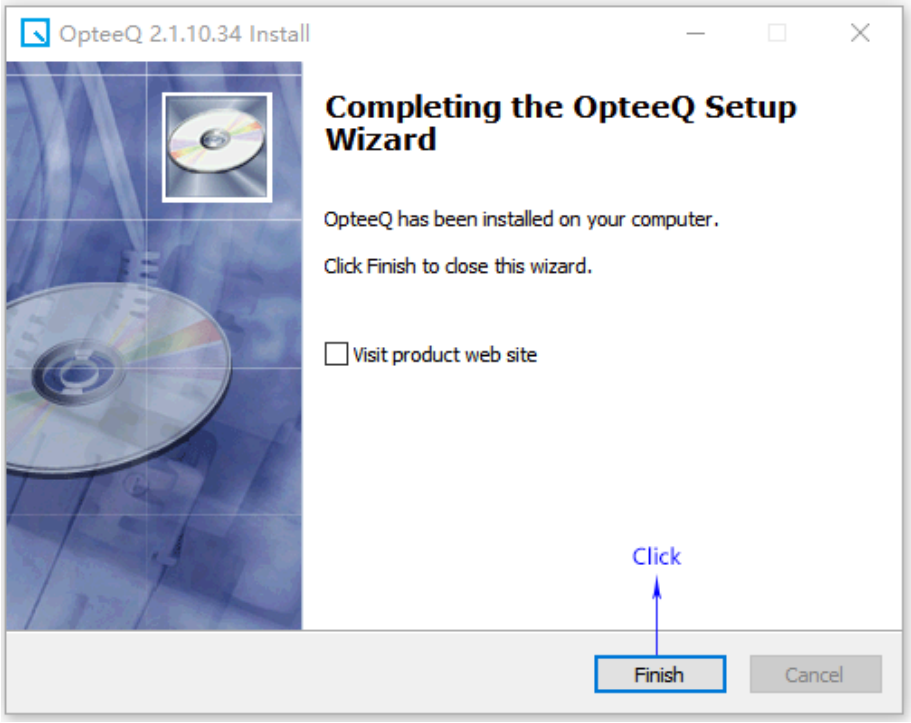



Figure 1.10: Step 10

Step 11: After the setup is finished following the above setup steps, an icon of this software will appear on the computer desktop, as shown in Figure 1.11.


Figure 1.11: Step 11 - Desktop Icon of Programmer Software

Step 12: Double-click the desktop icon of the software to pop up its main interface, as shown in Figure 1.12.

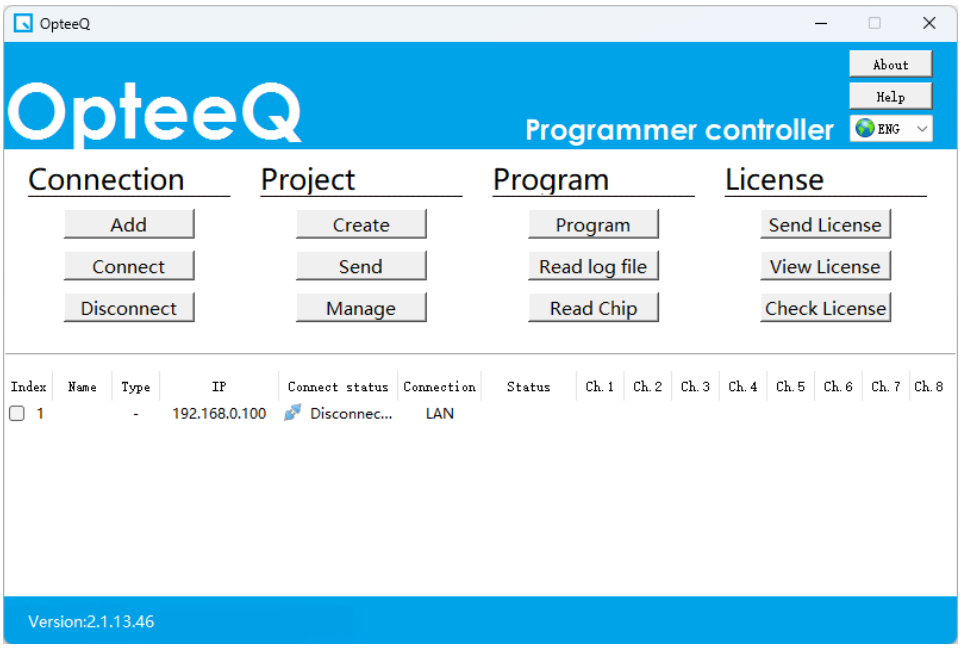



Figure 1.12: Step 12 - Main Interface of Programmer Software

# 2 Product Overview

This chapter mainly gives users an access to understand the hardware and software characteristics of OPTEEQ S1 In-system Programmer (hereinafter referred to as the programmer), and quickly master the characteristics of this product.

## 2.1 Version Information

The version information of the programmer may vary due to software updates and programmer models. The version information of this product in this chapter is shown as follows:

- Programmer control software version: V2.1.10.38
- Embedded software version: 2.10.73
- FPGA version: V3.12

After the programmer software is set up and connected, its main interface will be displayed. The user may click "About" in the upper right corner to check the version number information, as shown in Figure 2.1.


Figure 2.1: Version Number Interface

## 2.2 About This Product

OPTEEQ S1 In-system Programmer, an ultra high-speed, industrial-grade in-system programmer, boasts various characteristics, such as a wide range of support interfaces, rich programming algorithms, stable performance, full protection of the target circuit, good integration and compact size. It can be embedded in a variety of testing devices (ATE, ICT, FCT, tooling and fixtures), and work in either manual or automatic mode. It is applied in testing, production and other links of electronic products, and in quite a few sectors such as industry, home appliances, automobiles and automation engineering. This product is attached with Chinese and English technical document, allowing users to enjoy full technical services, and fast and localized support.

## 2.3 Product Features

- Ultra-high programming speed
- General-purpose programmer, supporting tens of thousands of devices from dozens of semiconductor companies
- Able to work in standalone manner
- Being combined with various testing devices (such as ATE, ICT and FCT) easily and quickly
- Compact outline; being embedded in various clamps, fixtures and tooling easily
- Being controlled by an external device to work automatically, or operated manually
- Quick response to user needs, Chinese and English product manual and technical support

## 2.4 Hardware Features

- Programming interface: JTAG, SWD, DAP, BDM, UART, SPI, SWIM, I2C, PIC-ICSP, etc.
- Protections for all I/O interfaces
- Programmable voltage adjustment for all I/O interfaces (1.65V-5.5V)
- Input voltage: 12V (DC)
- Supporting SD card expansion, with a maximum capacity of 32GB
- Supporting connection to various external devices (ATE, ICT, FCT, control board and PC) through expansion interfaces
- Control signal with optoelectronic isolation
- Three programming status indication signals with optoelectronic isolation
- Supporting connection with PC via USB or Ethernet
- Full and clear indication of programmer status through LED indicators

## 2.5 Software Features

- Available in Windows 7/8/10/11
- Chinese/English user interface
- Providing DLL for external software extension
- Full protection of user data
- Enable easy firmware upgrade

- Automatic generation of log files during programming process
- Enable erasing, blank check, programming, reading, verifying, oscillator trimming settings

# 3 Hardware Overview

## 3.1 Top View of the Programmer

The main function modules that users need in use include input power, programming signal interfaces J5, control signal interface J6, LED indicator, SD card, USB interface and network interface. Their specific locations are shown in Figure 3.1.

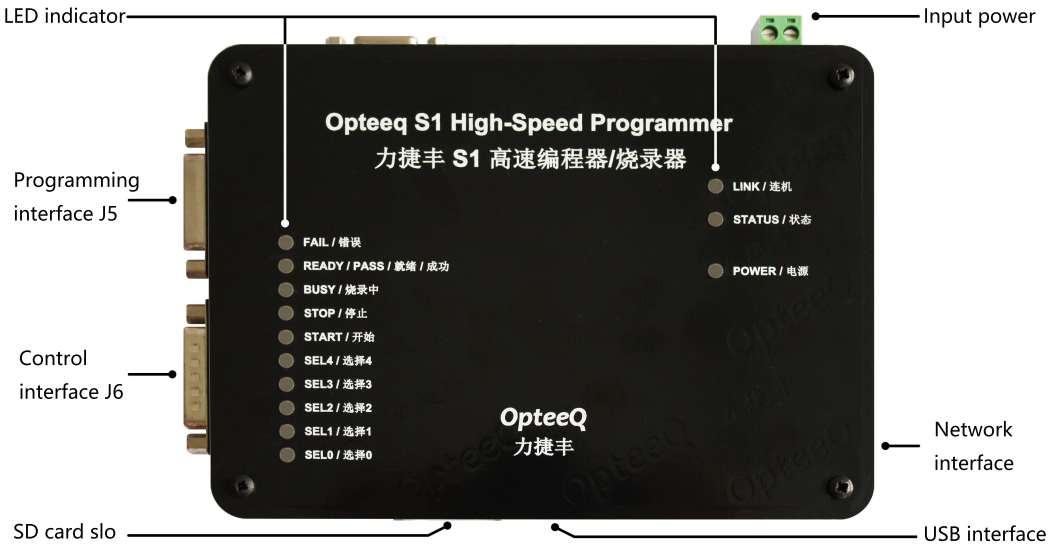



Figure 3.1: Top View of the Programmer

## 3.2 Input Power

Input power: 12V (DC)

## 3.3 Programming Signal Interfaces J5

Programming signal: J5 interfaces in the programmer is a programming interface (as shown in Figure 3.2), and the J5 interface is a D-type connector (plug) with 15 pins. It's connected to the programming interface of the target chip through programming signal interfaces J5, or the interface said is connected to the programming interface of the target chip through the programming wire offered by the Company, different chips require different programming wiring schematic diagrams correspondingly. For detailed wiring diagrams, please refer to Chapter 7 "Wiring Schematic Diagram of S1 Programmer" herein.

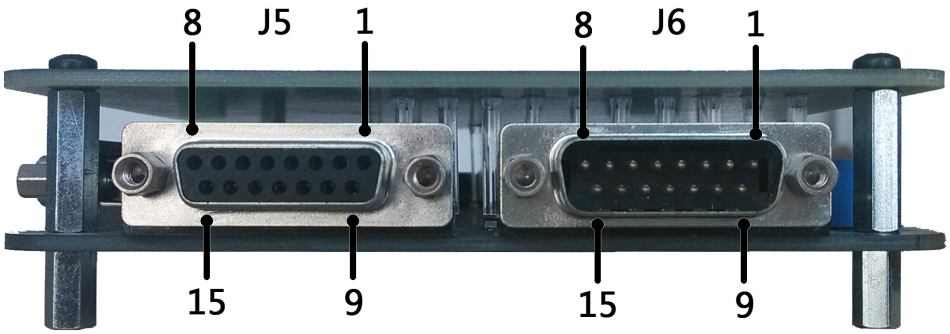



Figure 3.2: Programming Signal Interfaces J5
(Notes: The marking number sequence of the pins is shown in Figure 3.2)

## 3.4 LED indicator

LED indicators: When the programmer is working, its LED indicators work to indicate its working status. The description of LED indicators and their corresponding signals used in the programming process are as follows:

FAIL: The LED indicator lights up when the programming is failed.

READY/PASS: The LED indicator lights up when the programming is succeeded.

BUSY: When the programmer begins to program, the LED indicator lights up; when the programmer completes one time of programming operations, the LED indicator lights off.

STOP:not in use.

START: when the signal is set to 0, the programmer is given an instruction to start program. After receiving the signal, the programmer will start program.

LINK: It is a linking status LED indicator. When the programmer is connected to a PC normally, the LED indicator lights up; when the programmer is disconnected to a PC, the LED indicator lights off.

STATUS: not in use.

POWER: It is a power LED indicator. When the system is powered on normally, the LED indicator lights up; when the system is powered off, the LED indicator lights off.

## 3.5 IP Address Reset Button of the Programmer

The IP address reset button of the programmer is shown in Figure 3.3.

Reset the IP address of the programmer: Power the programmer off first; then press and hold the red reset button in the programmer; finally power the programmer on; wait for 5 s and then release the red reset button to initiate the IP address of the programmer, with the initial IP address of 192.168.0.100.


Figure 3.3: IP Address Reset Button of the Programmer

## 3.6 Programmer Size Figure

The size of the programmer is shown in Figure 3.4 Figure 3.5 and Figure 3.6.

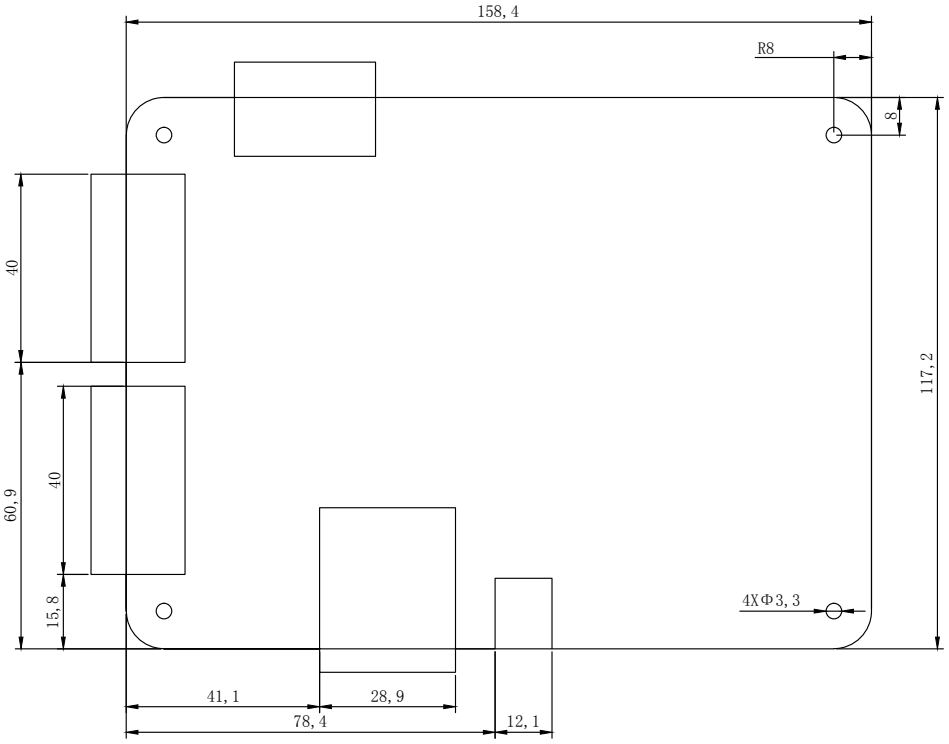



Figure 3.4: Top-view Size of the Programmer (Unit: mm)

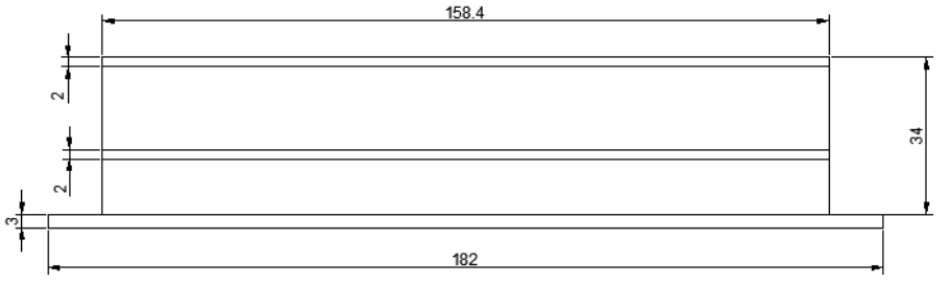



Figure 3.5: Front-view Size of the Programmer (Unit: mm)

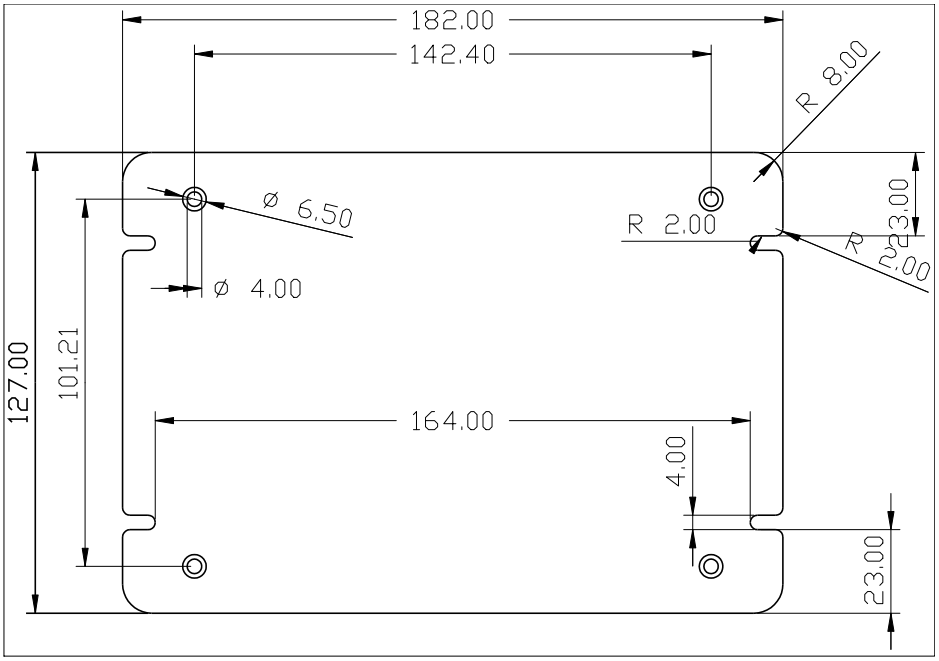



Figure 3.6: Bottom-view Size of the Programmer (Unit: mm)

## 3.7 Standalone programming accessories

The standalone programming accessories (S1) is a standard accessory for the programmer. Its specific appearance is shown in the following figure. Its main function is to be used in conjunction with the programmer for offline program. For related operations, please refer to the content of the offline program chapter.

Figure 3.7: Standalone programming accessories

# 4 Software Overview

This chapter details the use method of the programmer control software.

## 4.1 Software Setup

Please read files in the USB flash disk provided by the Company first; double-click the setup program folder and double-click the programmer control software setup package; click "Next" buttons with default configurations until the setup is finished. For detailed setup steps, please refer to Chapter 1 "Software Setup Process" hereof.

Notes: As for Win10 operating system, it is needed to disable the driver mandatory signature (also known as disabling digital signature) before software setup.

## 4.2 Main Interface

Access the main interface after opening the software, as shown in Figure 4.1.

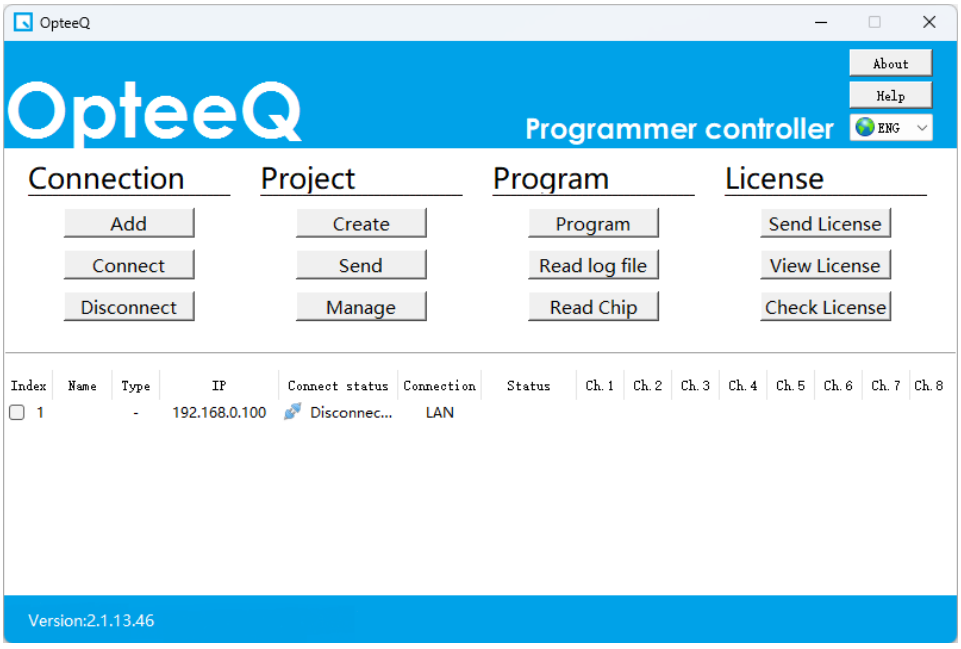



Figure 4.1: Main Interface of the Programmer Control Software

## 4.3 Programmer Addition (network interface)

In order to connect the programmer to a PC through the network interface, it is needed to add the programmer manually. To be specific, click "Add Programmer" and input the IP address of the programmer to be added in the pop-up dialog box, as shown in Figure 4.2 and Figure 4.3.

The IP address of a new programmer is "192.168.0.100" by default and the port number is 8000.

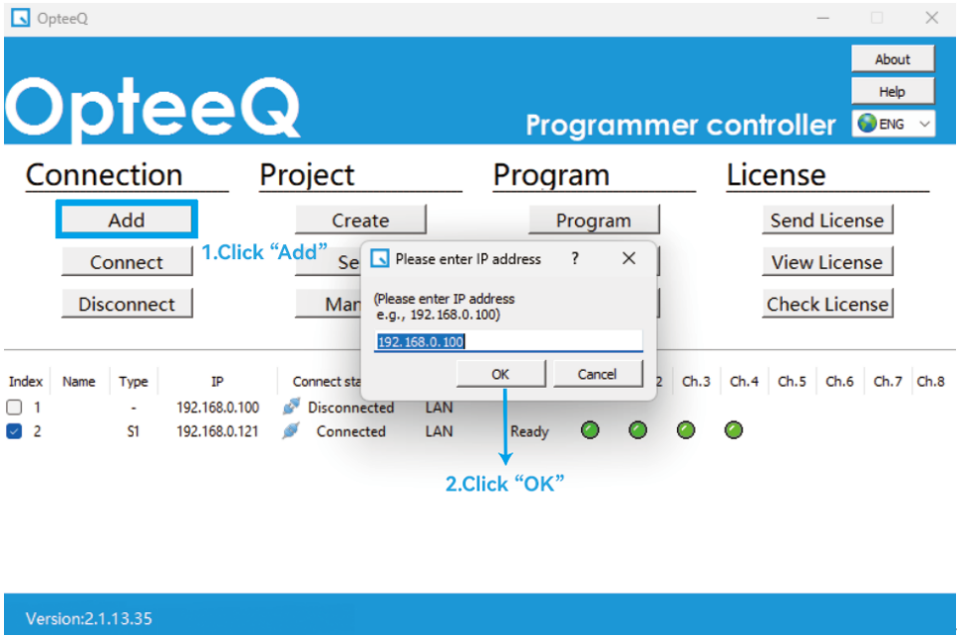



Figure 4.2: Step 1 - Add Programmer

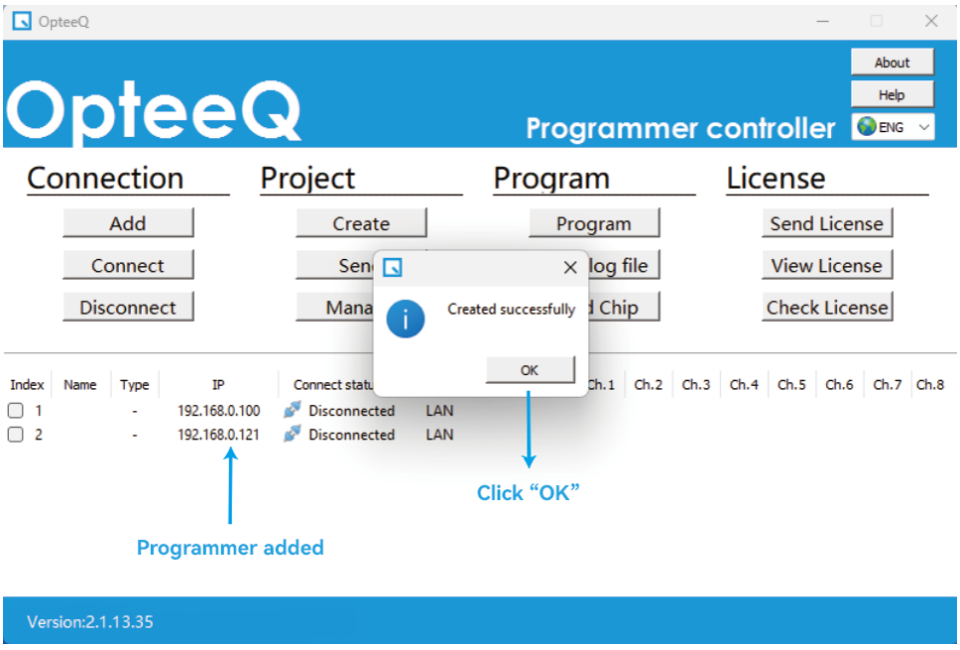



Figure 4.3: Step 2 - Programmer Adding Interface

## 4.4 Programmer Connection

Connect the programmer to a PC. When the programmer is connected to a PC through the network cable, it is needed to modify the IP address of the computer network or modify the IP address of the programmer before clicking "Connect Programmer" so that the IP addresses of the PC and the programmer fall into the same network segment. The method of modifying the IP address of the computer network is shown as follows.

### 4.4.1 IP Address Setting for the Computer Network

Set the IP address of the computer network: Take win10 as an example. Place the mouse on the "Network" shortcut icon on the computer desktop → right-click and select properties → change adapter settings → Ethernet (right-click and select properties) → double-click the Internet protocol version 4 (TCP/ IPv4) → use the following IP address by inputting the address of 192.168.0.133 (this IP address and that of the programmer (192.168.0.100) shall fall into the same network segment, but they are different in the last three digits) → click "OK", as shown in Figures 4.4, 4.5, 4.6, 4.7 and 4.8.

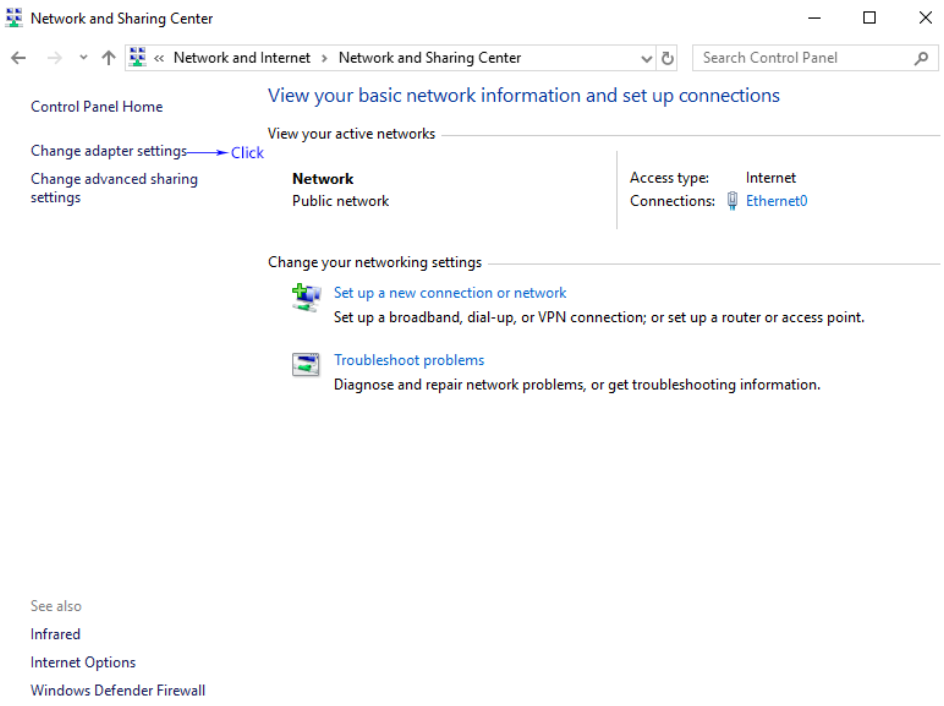



Figure 4.4: Step 1 for Modifying the IP Address of the Computer

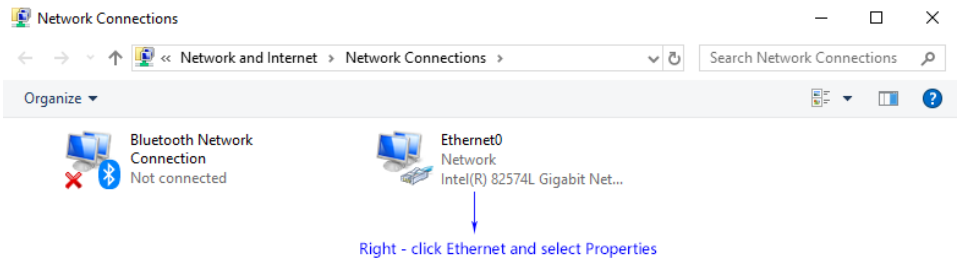



Figure 4.5: Step 2 for Modifying the IP Address of the Computer

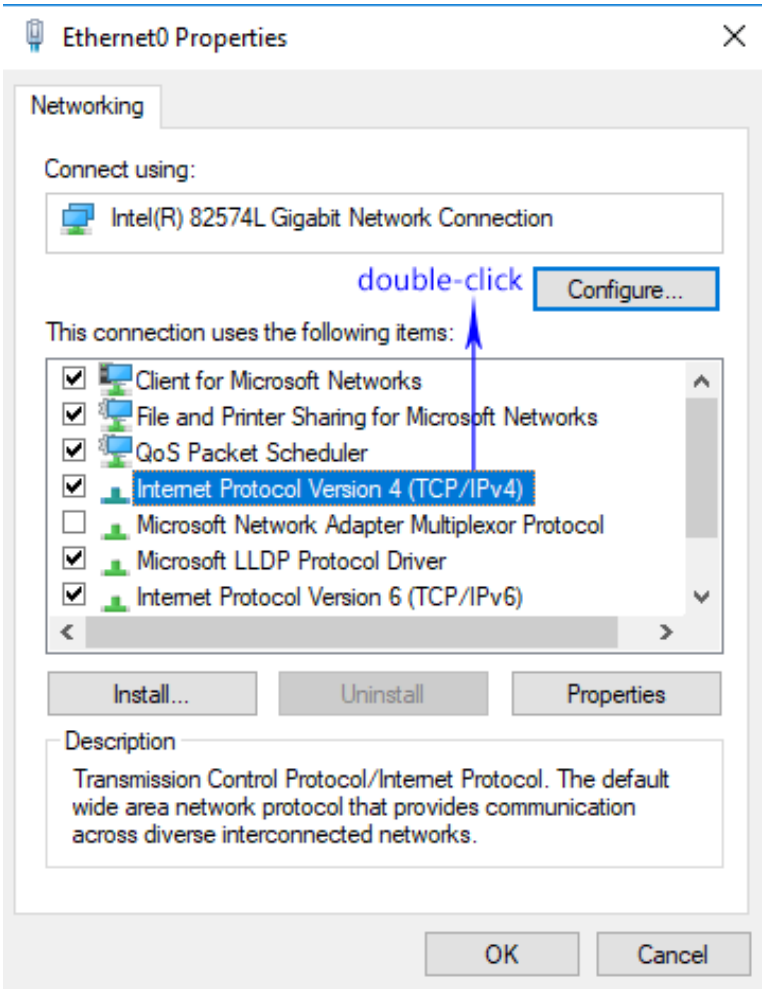



Figure 4.6: Step 3 for Modifying the IP Address of the Computer

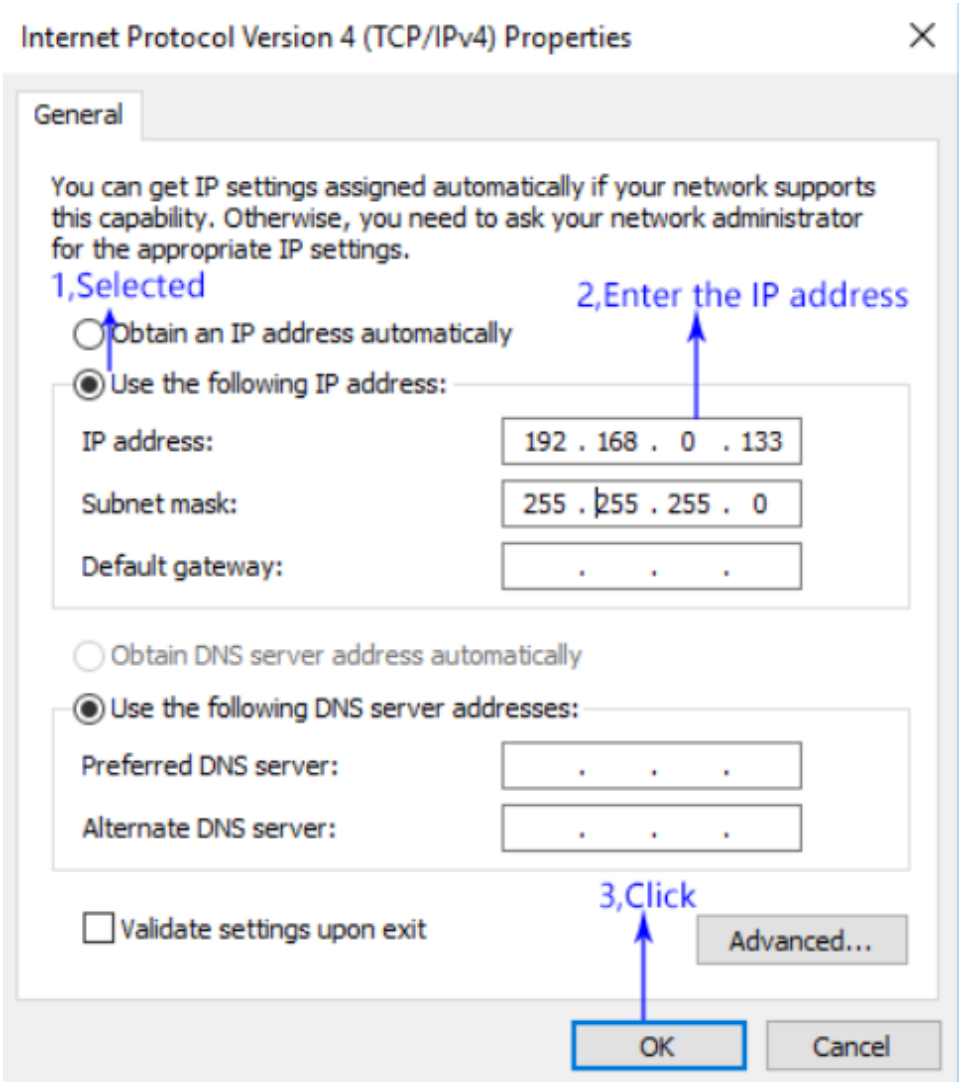



Figure 4.7: Step 4 for Modifying the IP Address of the Computer

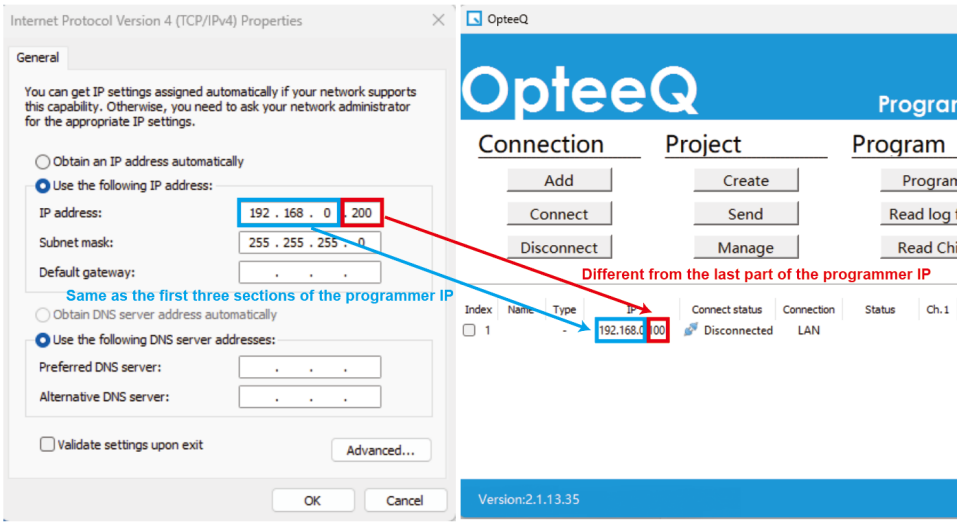



Figure 4.8: Comparison between the IP Addresses of the Computer and the Programmer

### 4.4.2 Programmer Connection

1)When the programmer is connected to a PC via the network cable, please make sure that the steps in Chapter 4.3 and 4.4.1 have been completed, namely the "Programmer Addition (Network Interface)" and "IP Address Setting for the Computer Network". Then, check the programmer under the corresponding serial number in the main interface of the programmer software before "Programmer Connection". Finally, click "Connect Programmer", as shown in Figure 4.9.

2)The display interface showing that the programmer has been connected successfully is shown in Figure 4.10. When the PC is connected to the programmer successfully, the "LINK" LED indicator in the programmer lights up.

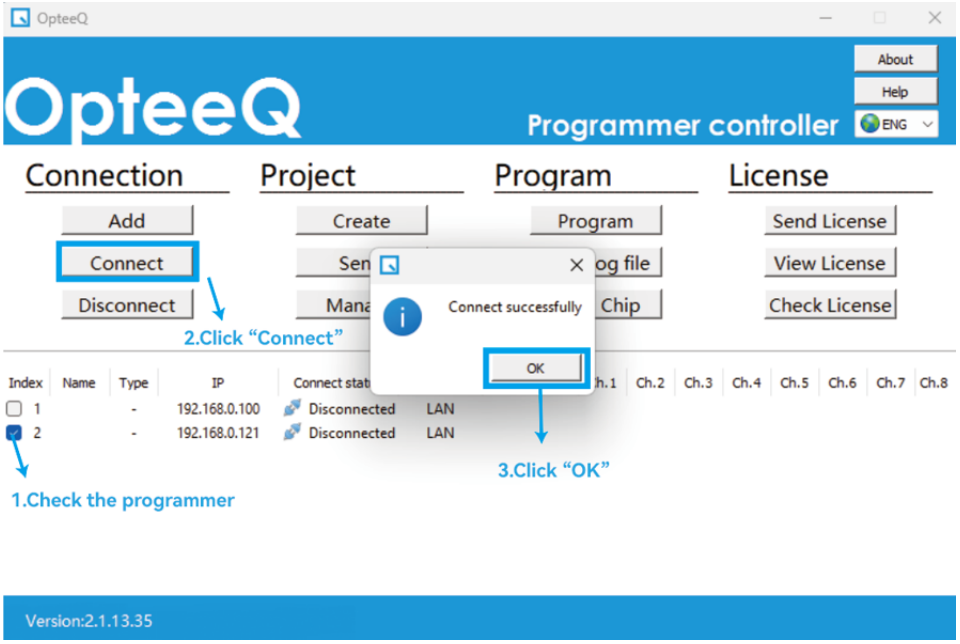



Figure 4.9: Programmer Connection

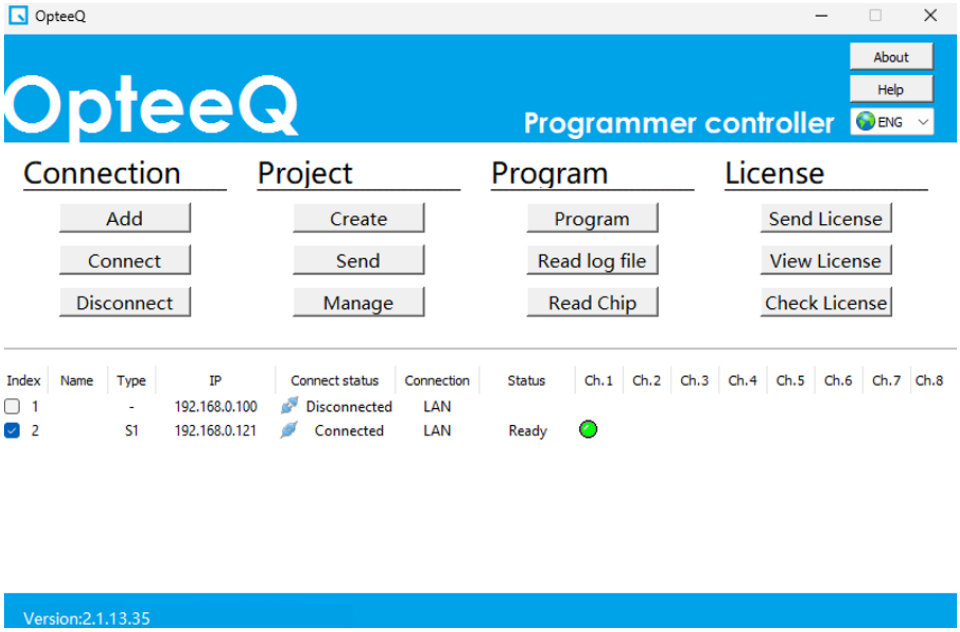



Figure 4.10: Display Interface Showing Successful Connection of the Programmer

## 4.5 Project Creation

It is needed to create a corresponding project before programming and send the project to the programmer. The specific operations are as follows:

1)Step 1: Click "Create" (as shown in Figure 4.11).

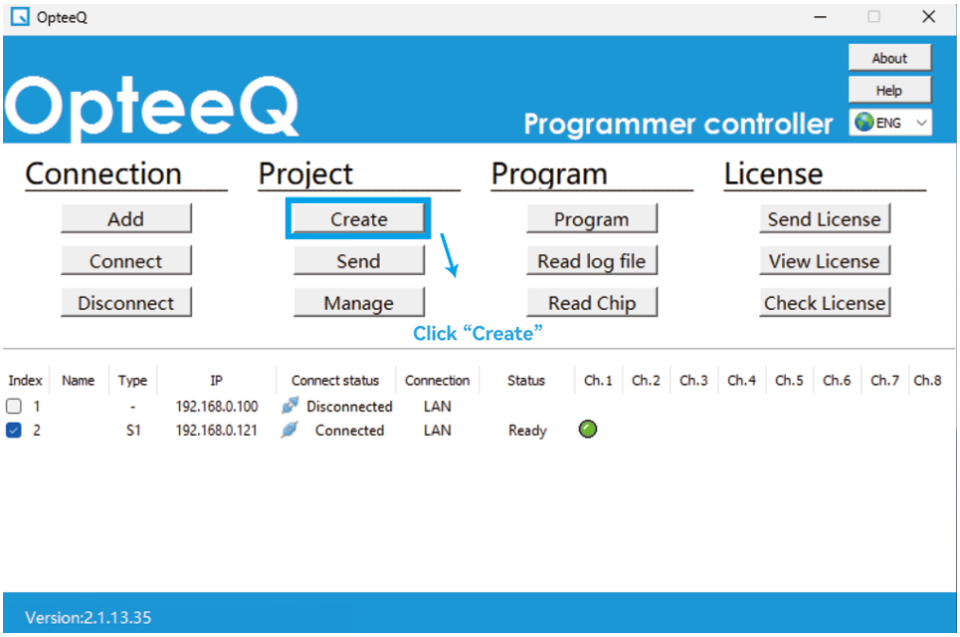



Figure 4.11: Step 1 - Project Creation

2)Step 2: Pop up the "Project Creation Wizard" dialog box, as shown in Figure 4.12.

It is needed to select a target chip to be programmed in the chip list (as shown in Figure 4.12-①).

Show the information of the corresponding chip after a target chip is selected (as shown in Figure 4.12-②).

Click "Next" after confirmation (as shown in Figure 4.12-③).

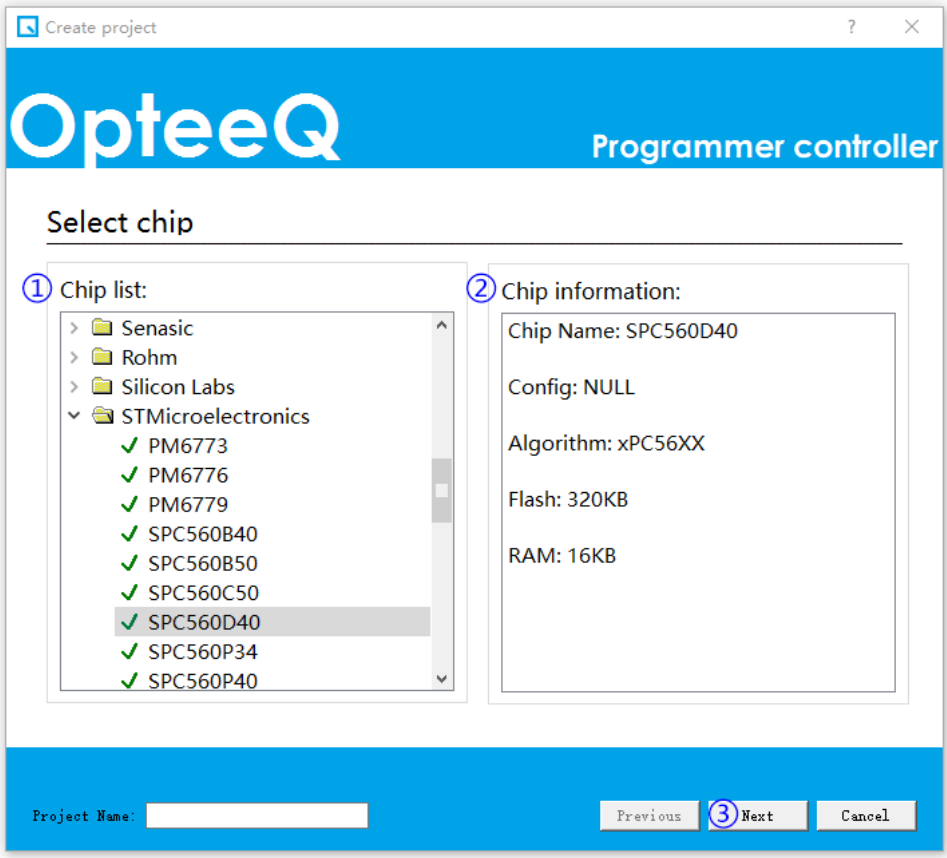



Figure 4.12: Step 2 - Project Creation Interface

3)Step 3: Select the programming file (as shown in Figure 4.13). Notes: The project creation interface varies among different chips.

It is needed to select the code file to be programmed into the target chip (as shown in Figure 4.13-①).

Then, please set the baseline value for programming (as shown in Figure 4.13-②).

Set the offset value (as shown in Figure 4.13-③).

It is needed to input the project name (as shown in Figure 4.13-④) after settings above.

Finally, click "Next" (as shown in Figure 4.13-⑤).

Notes: The blank value (Figure 4.13-②) and offset (Figure 4.13-③) value may be default values, or may be changed according to the user's needs.


Figure 4.13: Step 3 - Project Creation Interface

4)Step 4: Configure the programmer (as shown in Figure 4.14).

Select the programmer model (as shown in Figure 4.14-①).

Check the programming rate of the programmer (default: 2.5 MHz) (as shown in Figure 4.14-②). Notes: In general, the value set does not exceed 5M as a high value may affect the stability of the signal.

To supply power to the target board, it is needed to check the check box before "Power Supply to the Target Board" (as shown in Figure 4.14-③). Notes: S1 programmer can only supply power to the target board at 3.3V. When the programmer does not supply power to the target board, please do not check the check box before "Power Supply to the Target Board".

The item in Figure 4.14-④ is unchecked as it is not used yet.

Finally, click "OK" (as shown in Figure 4.14-⑤) to start creating a project.

If the PC has been connected to the programmer after a project is created successfully, the software will ask the user whether to send the project to the programmer. The user may choose "Yes" to send the project to the programmer.

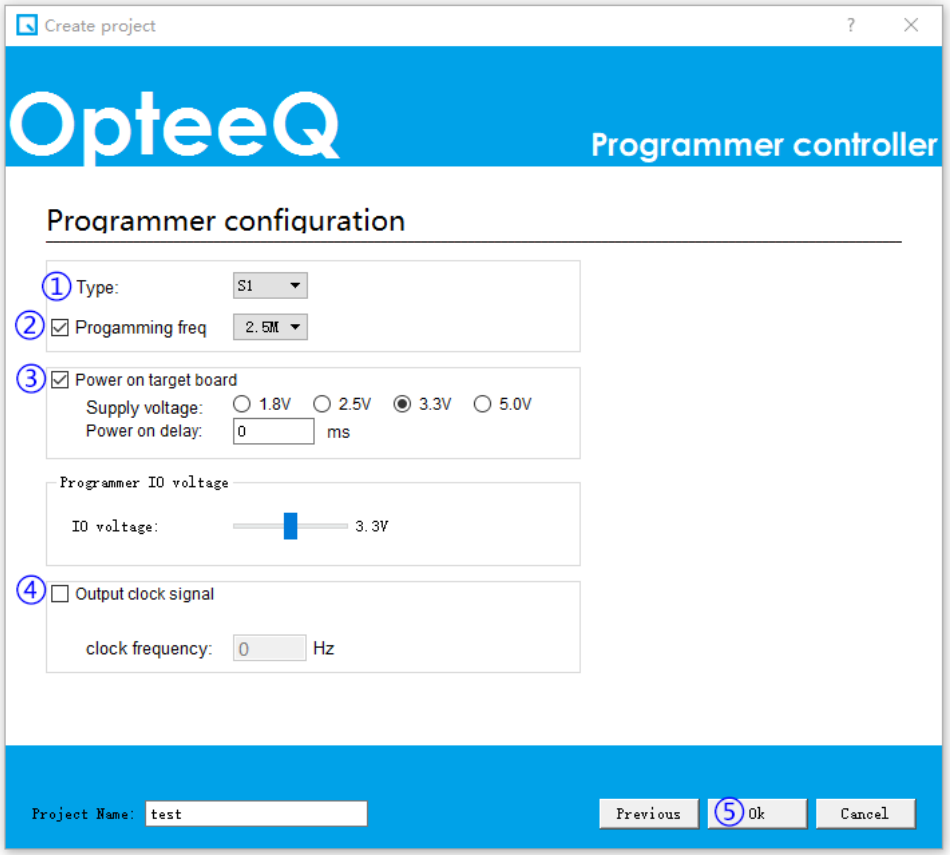



Figure 4.14: Step 4 - Project Creation Interface

## 4.6 Project Sending

After a project is created, it is needed to send the project to the programmer (if the project has been sent to the programmer after the project is created, please omit this step). Click "Send", popping up a dialog box "Open Project File"; select the created project file whose format is sct (the created project is in the "Project" folder under the software setup directory); click "Open" to send the project file to the programmer (as shown in Figure 4.15). The interface showing the project has been sent successfully is shown in Figure 4.16.

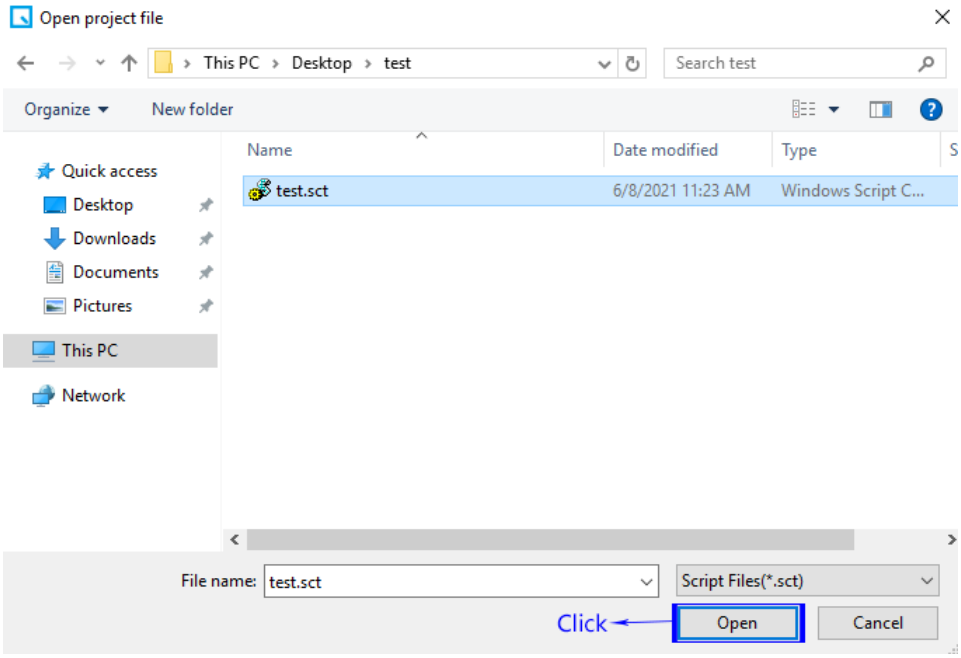



Figure 4.15: Selection of the Project to be Sent

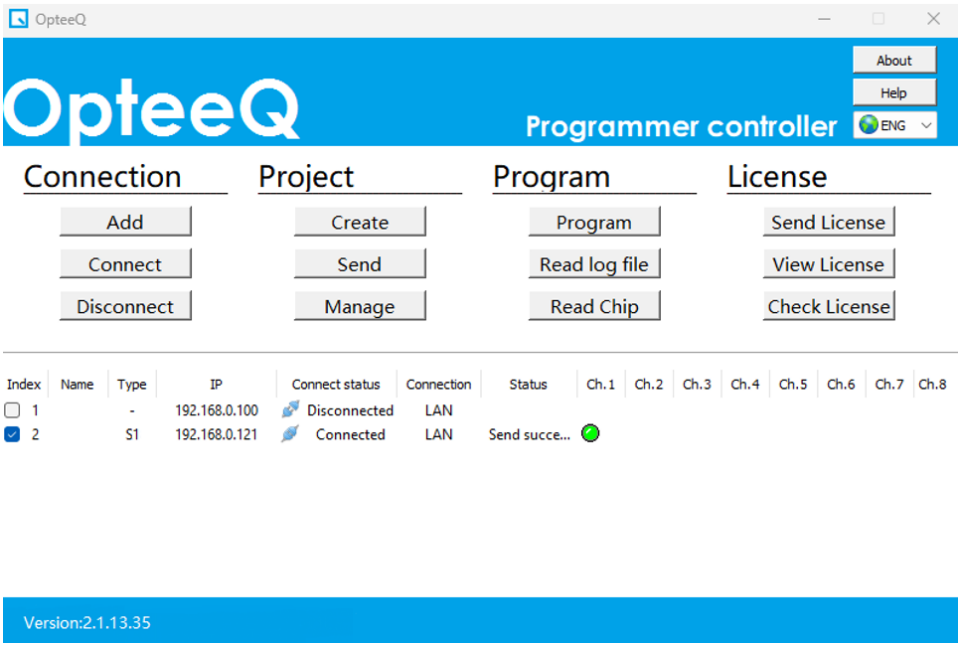



Figure 4.16: Interface Showing Successful Sending of the Project

## 4.7 Project Management

1)Click "Manage" (as shown in Figure 4.17).

2)Pop up the project list window (as shown in Figure 4.18).

The list gives the names of projects in the current programmer, and it is needed to check the project first (as shown in Figure 4.18-①).

Then, click "Delete Project" to delete the checked project (as shown in Figure 4.18-②).

It is also allowed to click "Read Project" to read the checked project (as shown in Figure 4.18-③).

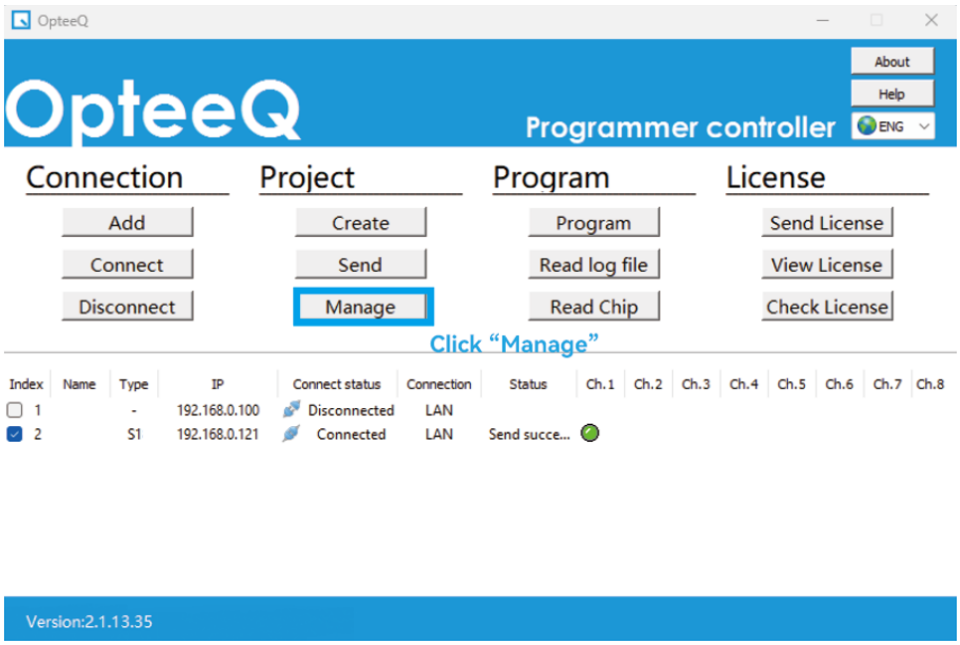



Figure 4.17: Project Management

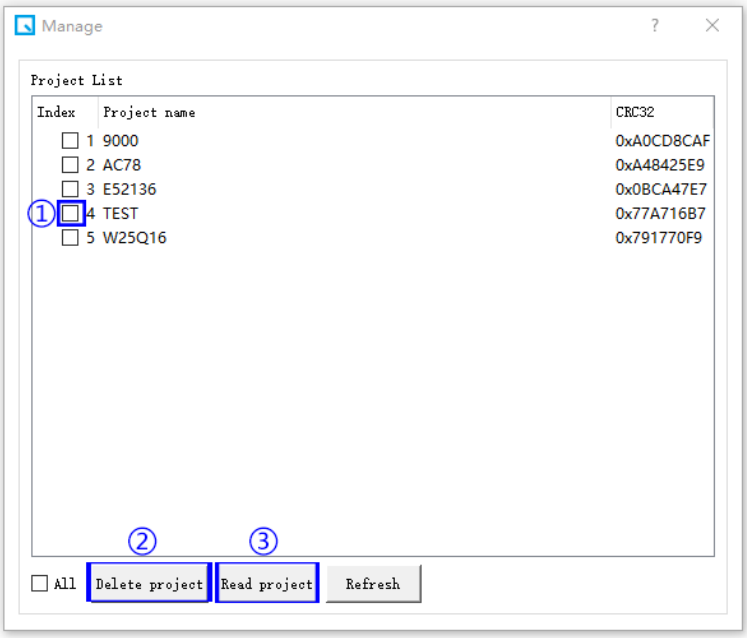



Figure 4.18: Project Management Interface

## 4.8 Program

After the project is created and sent to the programmer, the corresponding project can be programmed. The specific operations are as follows:

1)Click "Program" (as shown in Figure 4.19-①).

2)Pop up a dialog box "Project to be Programmed" to input the project name to be programmed (as shown in Figure 4.19-②).

3)Check "Channel Seletion" in the dialog box. Notes: S1 Programmer only Select Channel 1 (as shown in Figure 4.19-③).

4)Click "Import serial number from file" to set dynamic data for the chip (for specific operations, please refer to Chapter 5 "Programming Serial Number" herein). If it is not intended to set dynamic data for the chip, this option may be omitted (as shown in Figure 4.19-④).

5)Click "Ok" to start programming (as shown in Figure 4.19-⑤).

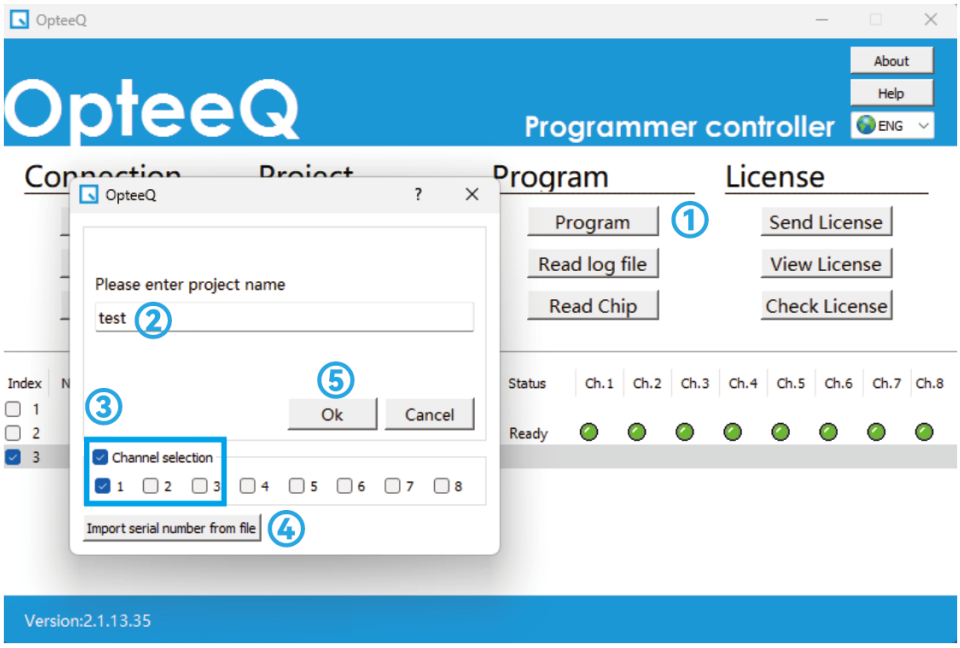



Figure 4.19: Program

6)When the programmer starts programming, the "BUSY" LED indicator in the programmer turns red. When programming is completed, the programming result is displayed in the software interface. the programming success interface will be displayed, as shown in Figure 4.20.

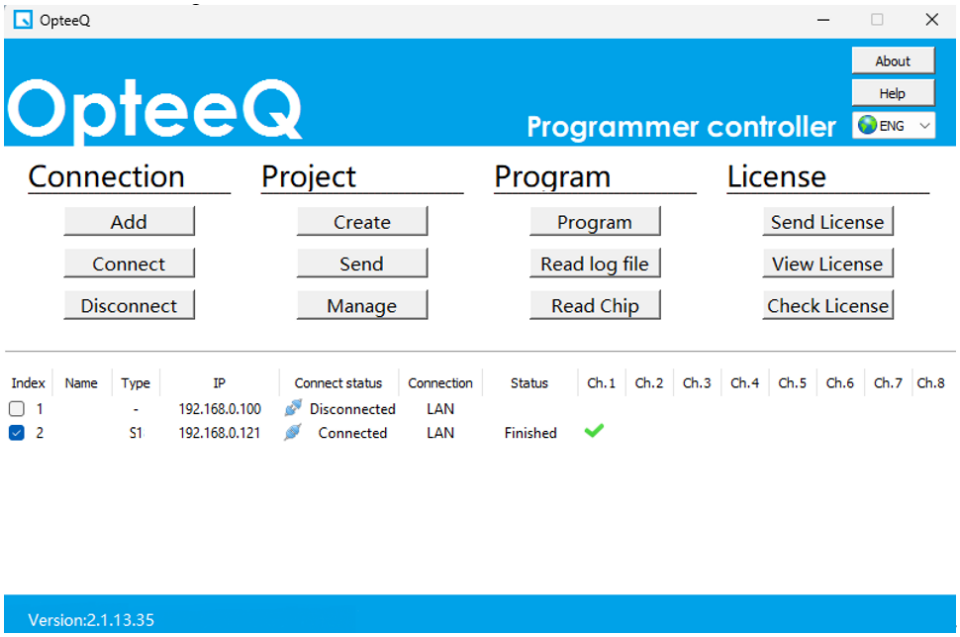



Figure 4.20: Programming Success Interface

7)If the programmer is not used any more after successful programming, please click "Disconnect", as shown in Figure 4.21.

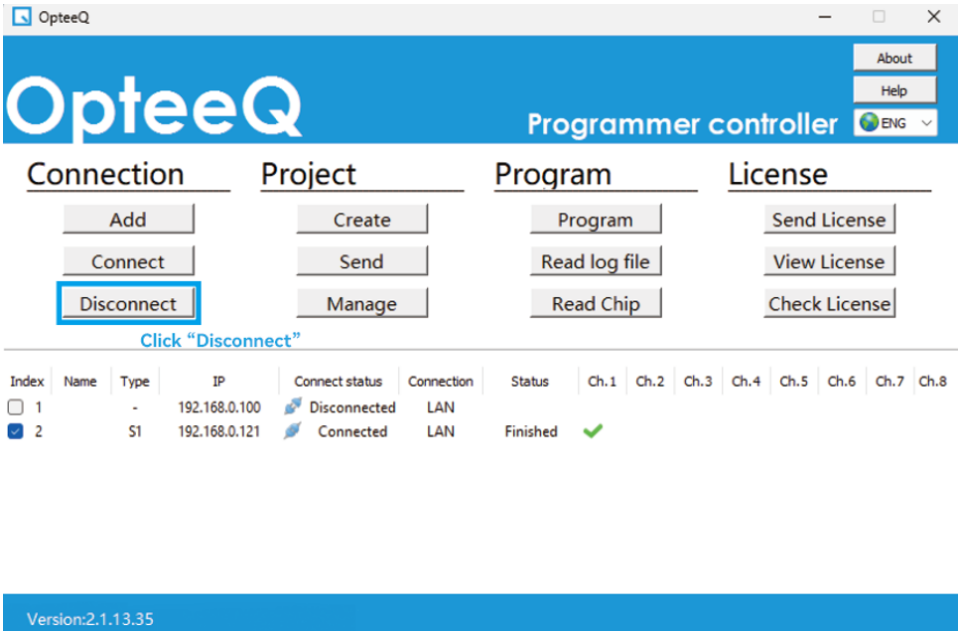



Figure 4.21: Programmer Disconnection

## 4.9 Programmer Deletion (network interface)

This operation is only applicable to the programmer using the network interface. When there are redundant programmers in the programmer list, it is allowed to right-click the row where the programmer is located, and click "Delete Programmer" in the pop-up menu, as shown in Figure 4.22.

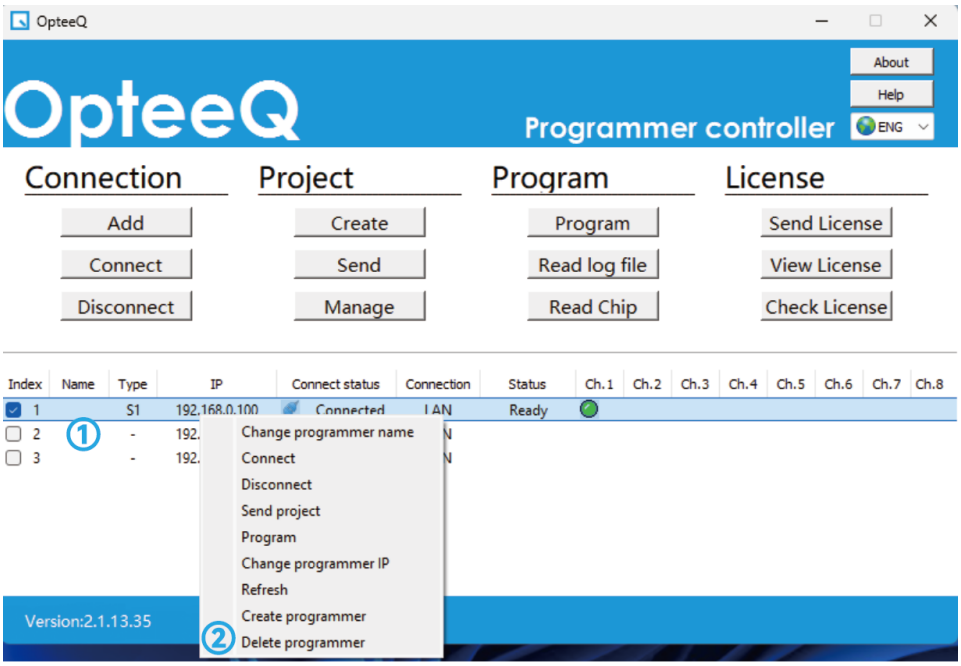



Figure 4.22: Programmer Deletion

## 4.10 Modification of A Programmer IP Address

This operation is only applicable to the programmer using the network interface, and functions to modify the IP address of the programmer. Right-click the row where the programmer is located, and click "Change programmer IP" in the pop-up menu, as shown in Figure 4.23.

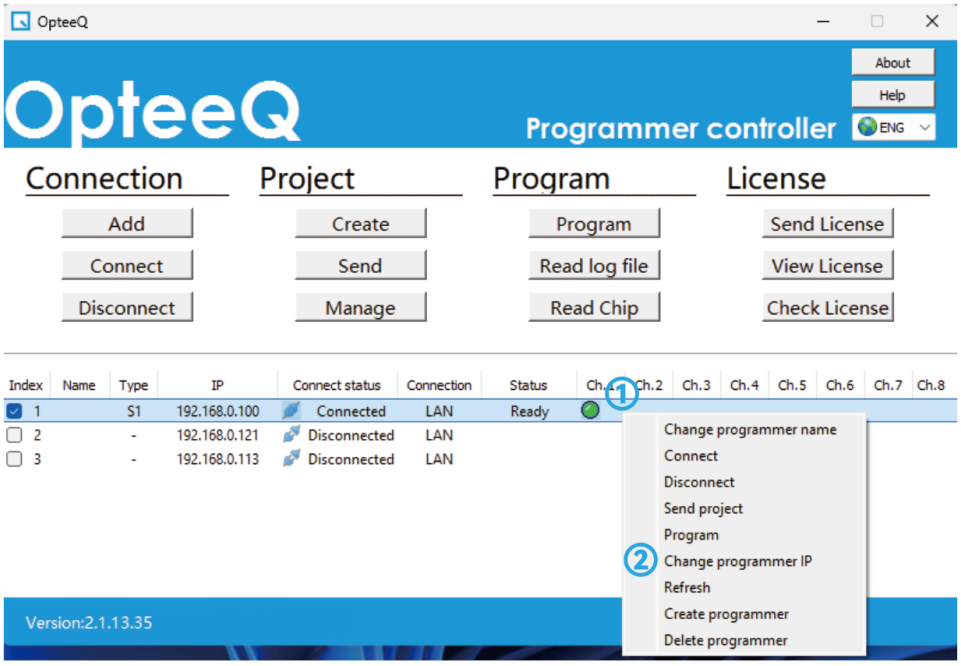



Figure 4.23: Modification of A Programmer IP Address

## 4.11 Modification of A Programmer Name

This operation functions to modify the programmer name. Right-click the row where the programmer is located; click "Change programmer IP" in the pop-up menu; then modify the programmer name in the pop-up window.

Alternatively, it is allowed to modify the programmer name in the pop-up window by double-clicking the row where the programmer is located.

# 5 Programming Serial Number

## 5.1 Function Description

To program with the programmer software (host computer), please click "Import serial number from file" to import the serial number in order to set dynamic data for the chip, as shown in Figure 5.1.

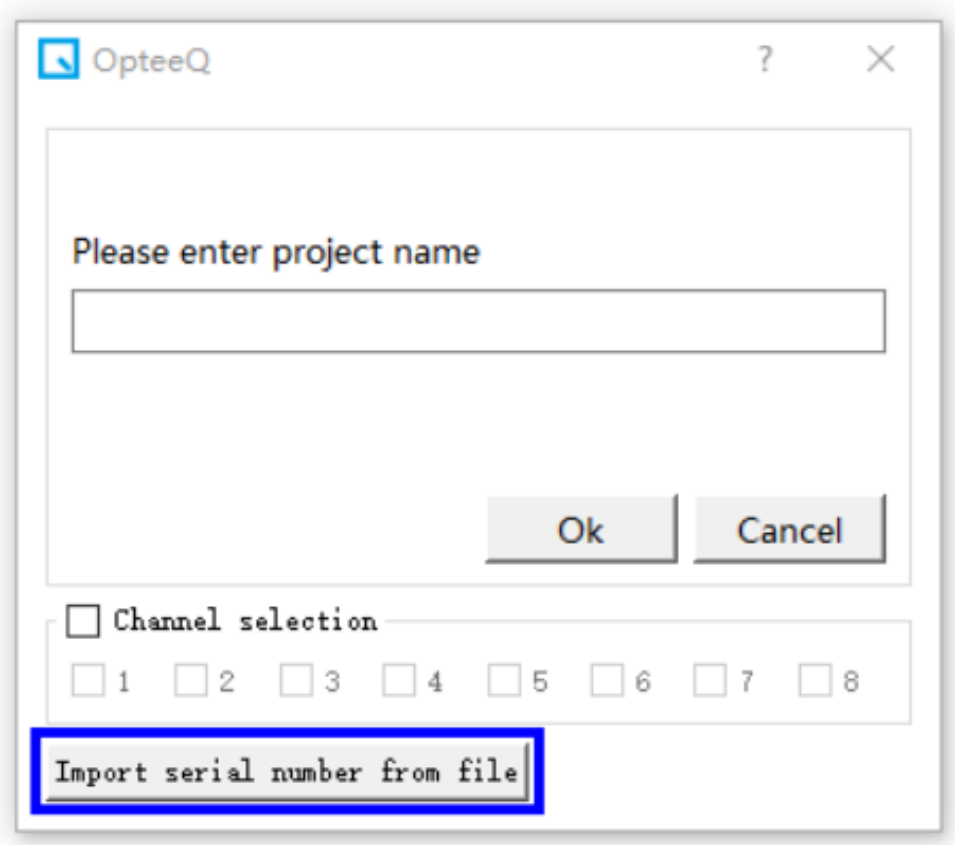



Figure 5.1: Programming Interface

Notes: The programmer will eventually program the serial number data into the FLASH of the chip.

Notes: After each programming operation, regardless of success or failure, the imported serial number will be cleared, and the serial number has to be re-imported.

## 5.2 Format Description

The serial number file is a TXT text file. The content in the file consists of multiple lines, with each line representing a serial number, as shown in Figure 5.2.

```
1  1,0x00800000,0A214F4301323F191378F5E701203AE7
2  1,0x00800100,62D10DE7732D23D002D8
3  1,0x00800200,E0DDB26E2B00D0C7E0013208926E2D00
4  1,0x00800300,ADE004E0
```

Figure 5.2: Text Content

The format of each line is shown as follows: channel number, hexadecimal address, and hexadecimal serial number data.

Channel number: It represents the channel to be programmed for the serial number. 1 8 indicates Channel 1 to Channel 8. 0 means that the serial number shall be programmed for all channels.

Hexadecimal address: The address is in hexadecimal format, with no need to add 0x. For instance, 0x00800000 can be replaced with 800000.

Hexadecimal serial number data: The serial number data are in hexadecimal format, and every two characters represent one byte. The minimum size of the serial number data is 1 byte (namely, 2 characters).

## 5.3 Application Example

Take "1,0x00800000,0A214F4301323F191378F5E701203AE7" as an example:

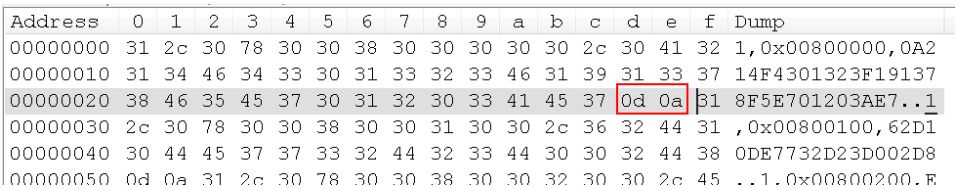
This line indicates that the programmer selects Programming Channel 1 to start programming the data "0A214F4301323F191378F5E701203AE7" at the address 0x00800000. After successful programming, the data of the starting address 0x00800000 are shown in Figure 5.3.

| Address | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ASCII |
|---|---|---|---|---|---|---|---|---|---|
| 0800000 | 0A | 21 | 4F | 43 | 01 | 32 | 3F | 19 | .!OC.2?. |
| 0800008 | 13 | 78 | F5 | E7 | 01 | 20 | 3A | E7 | .x... :. |
| 0800010 | 01 | 07 | 01 | 01 | A0 | FF | 85 | 80 | ........ |
| 0800018 | 00 | F5 | B4 | B4 | 1C | 26 | 02 | 13 | .....&.. |
| 0800020 | 0B | E4 | FE | 05 | 04 | 80 | 80 | 08 | ........ |
| 0800028 | 20 | E5 | 7C | 88 | BA | 80 | 0B | 00 | .!..... |
| 0800030 | 08 | 31 | 32 | 38 | 6B | 2E | 62 | 69 | .128k.bi |
| 0800038 | 6E | 00 | 02 | 02 | 08 | DE | EE | 8C | n |

Figure 5.3 Application Example

## 5.4 Announcements

1)Line feed is enabled by 0x0d0a, as shown in Figure 5.4. It shows the hexadecimal data of the TXT file, where 0d 0a is the line break.



| Address | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | a | b | c | d | e | f | Dump |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00000000 | 31 | 2c | 30 | 78 | 30 | 30 | 38 | 30 | 30 | 30 | 30 | 30 | 2c | 30 | 41 | 32 | 1,0x00800000,0A2 |
| 00000010 | 31 | 34 | 46 | 34 | 33 | 30 | 31 | 33 | 32 | 33 | 46 | 31 | 39 | 31 | 33 | 37 | 14F4301323F19137 |
| 00000020 | 38 | 46 | 35 | 45 | 37 | 30 | 31 | 32 | 30 | 33 | 41 | 45 | 37 | 0d | 0a | 31 | 8F5E701203AE7..1 |
| 00000030 | 2c | 30 | 78 | 30 | 30 | 38 | 30 | 30 | 31 | 30 | 30 | 2c | 36 | 32 | 44 | 31 | ,0x00800100,62D1 |
| 00000040 | 30 | 44 | 45 | 37 | 37 | 33 | 32 | 44 | 32 | 33 | 44 | 30 | 30 | 32 | 44 | 38 | 0DE7732D23D002D8 |
| 00000050 | 0d | 0a | 31 | 2c | 30 | 78 | 30 | 30 | 38 | 30 | 30 | 32 | 30 | 30 | 2c | 45 | ..1,0x00800200,E |

Figure 5.4 Description of Line Break

2)The commas among channel number, address and data shall be English ones (",").

3)There is no sequence between lines, any combination.

4)The number of characters for serial number data shall be even.

5)Although there is no limit to the number of characters for serial number data in each line, it is necessary to ensure that the total size of the serial number data taken up by all lines shall not exceed 1,024 bytes.

The size calculation method of the serial number data is shown as follows:

The number of data bytes for each line is: fixed value 12 + number of serial number data bytes (number of characters/2) For example:

"4,0x00800000,423456781234AB" takes up 19 bytes (12+7),

"0,0x00800104,02345678" takes up 16 bytes (12+4).

"1,0x00800000,0A214F4301323F191378F5E701203AE7" takes up 28 bytes (12+16).

Notes: The total size of the serial number data taken up by all lines shall not exceed 1,024 bytes.

# 6 Software Upgrade and License

## 6.1 Software Upgrade

Click the new software setup package and keep clicking "Next" buttons. Its setup is conducted following the "Software Setup Process" in Chapter 1.

## 6.2 License

After the user purchases the chip programming license, he/she needs to add the license to the programmer.

1) Click "Send License"(as shown in Figure 6.1-①).
2) Select the license in the dialog box that appears(as shown in Figure 6.1-②)
3) Click "Open" to add License (as shown in Figure 6.1-③).

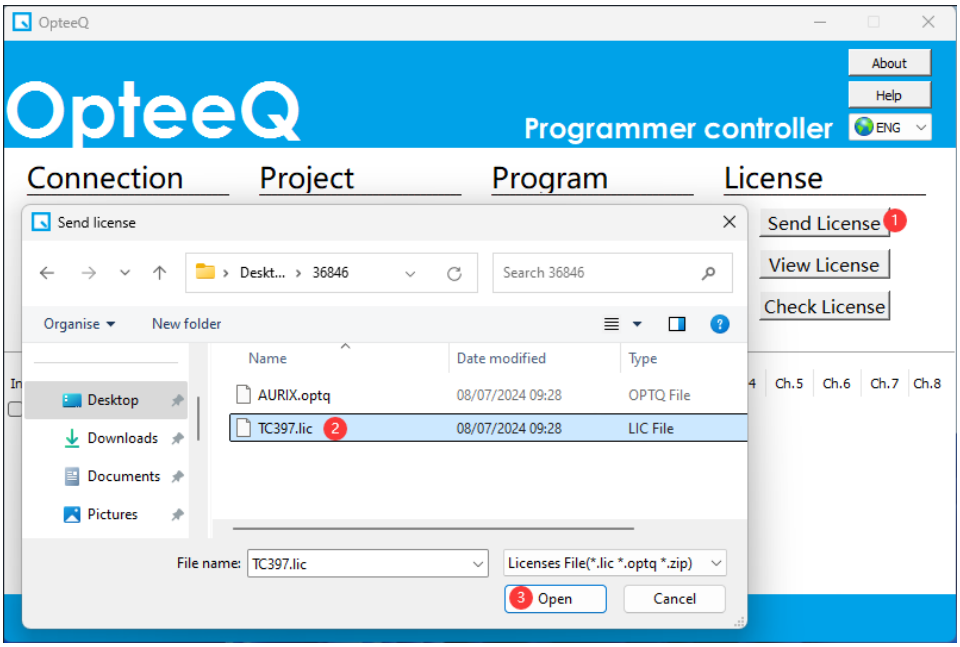



Figure 6.1 License

# 7 Wiring Schematic Diagram of S1 Programmer

## 7.1 Programming Wire

This chapter describes the wiring definition of S1 Programmer, and shows the wiring diagram between the programmer and the target chip. Different wiring diagrams are designed for different chips. The programming interface of the target chip will be connected to the J5 interface of the programmer (as shown in Figure 7.1) directly or through the programming wire provided by the Company (as shown in Figure 7.2). Port number of the programming wire provided by the Company (as shown in Figure 7.3).

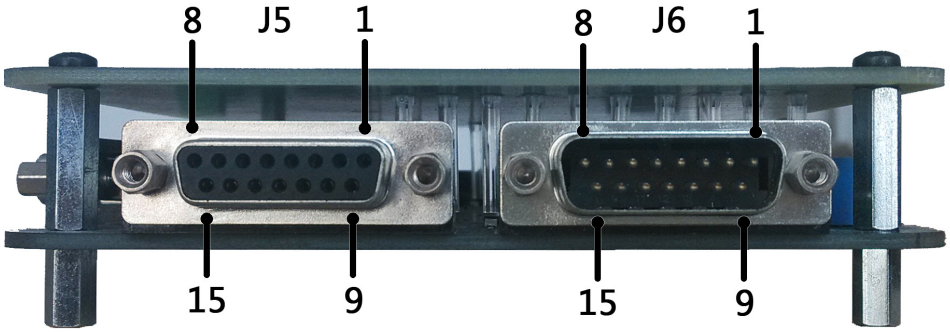



Figure 7.1: Programming Signal Interfaces J5
(Notes: The marking number sequence of the pins is shown in Figure 7.1)

Figure 7.2: Programming Wire Provided by the Company

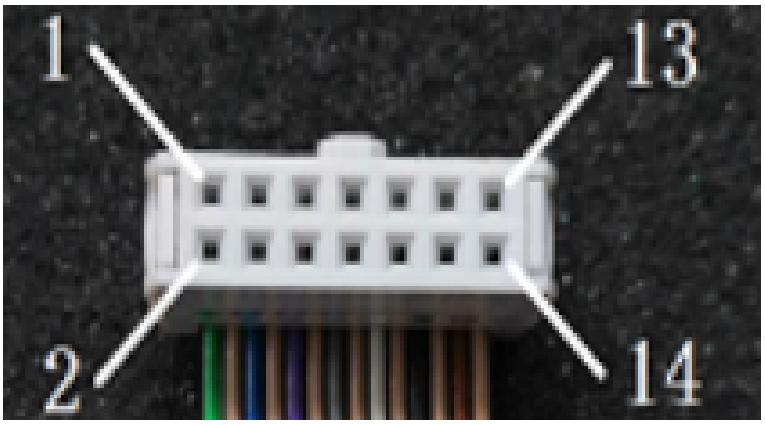



Figure 7.3: Port Number of Programming Wire Provided by the Company

## 7.2 JTAG_1 Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and JTAG_1 programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and JTAG_1 programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

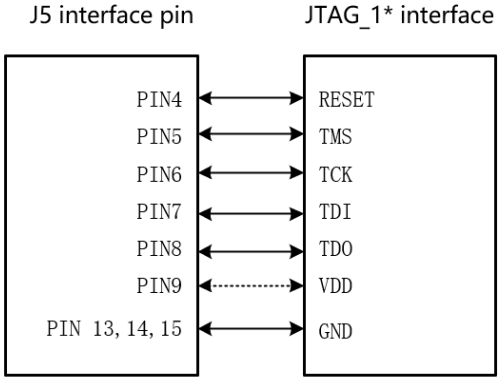



Figure 7.4: Connection between J5 interface and JTAG_1 interface

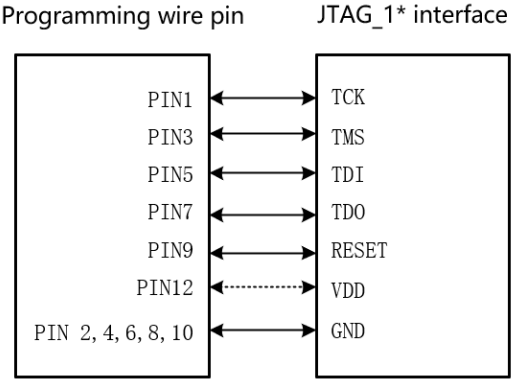



Figure 7.5: Connection between S1 programming wire and JTAG_1 interface

## 7.3 JTAG_2 Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and JTAG_2 programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and JTAG_2 programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

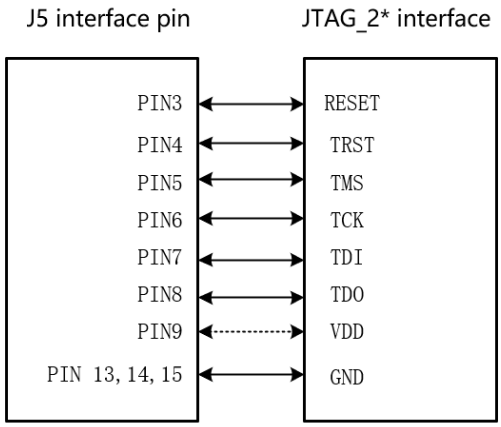



Figure 7.6: Connection between J5 interface and JTAG_2 interface

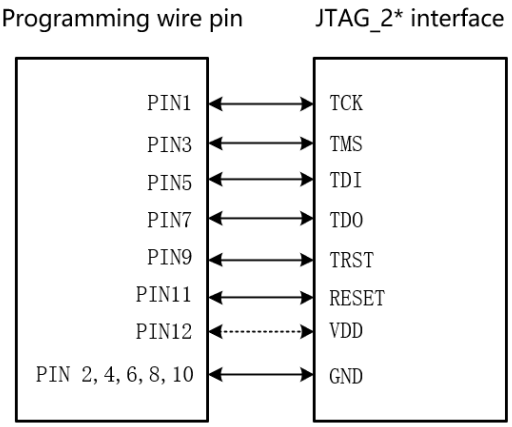



Figure 7.7: Connection between S1 programming wire and JTAG_2 interface

## 7.4 JTAG_3 Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and JTAG_3 programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and JTAG_3 programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

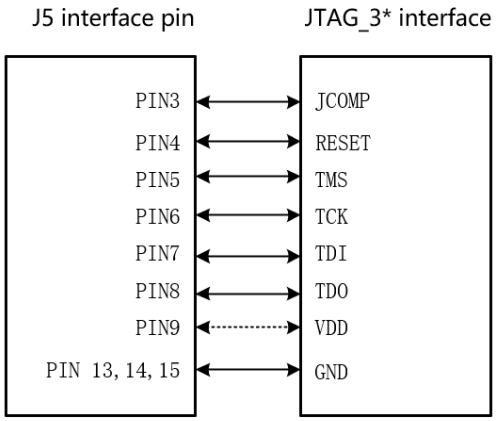



Figure 7.8: Connection between J5 interface and JTAG_3 interface

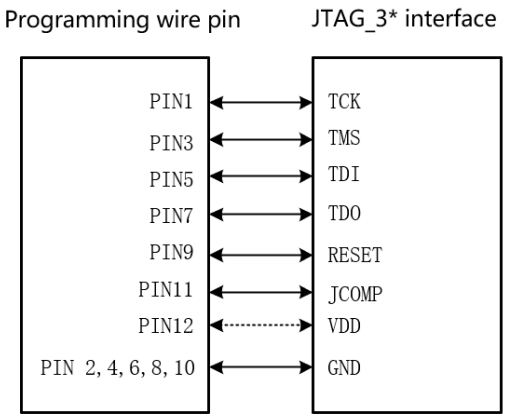



Figure 7.9: Connection between S1 programming wire and JTAG_3 interface

## 7.5 SWD Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and SWD programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and SWD programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

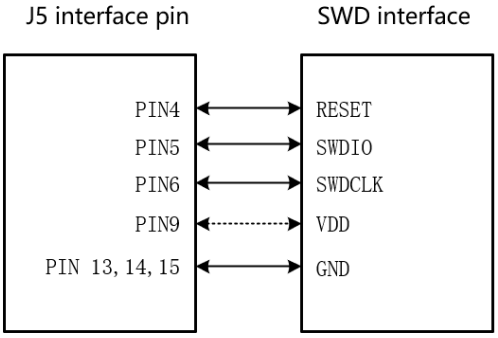



Figure 7.10: Connection between J5 interface and SWD interface

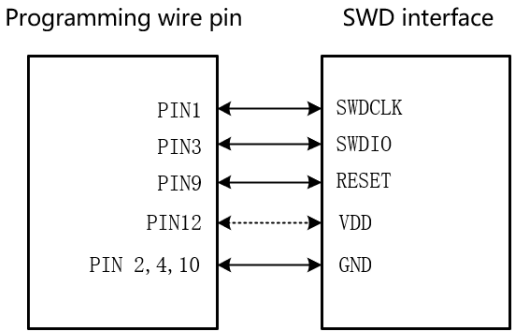



Figure 7.11: Connection between S1 programming wire and SWD interface

## 7.6 DAP Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and DAP programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and DAP programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

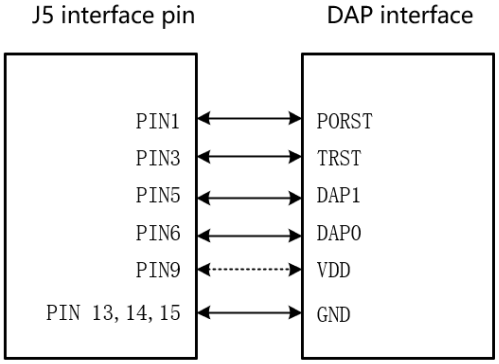



Figure 7.12: Connection between J5 interface and DAP interface

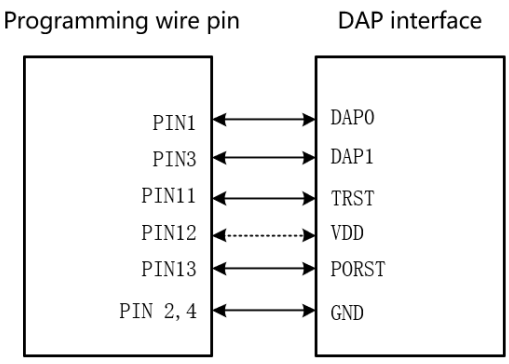



Figure 7.13: Connection between S1 programming wire and DAP interface

## 7.7 Single-wire BDM Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and Single-wire BDM programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and Single-wire BDM programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

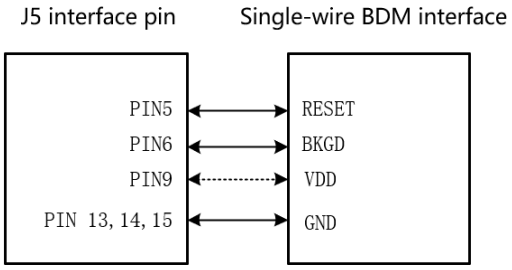



Figure 7.14: Connection between J5 interface and Single-wire BDM interface

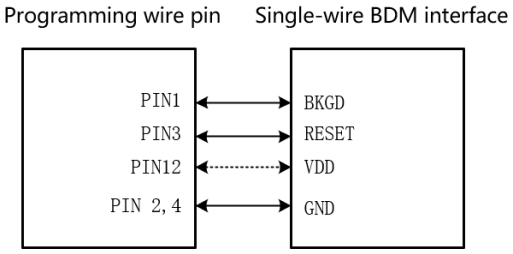



Figure 7.15: Connection between S1 programming wire and Single-wire BDM interface

## 7.8 Multi-wire BDM Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and Multi-wire BDM programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and Multi-wire BDM programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

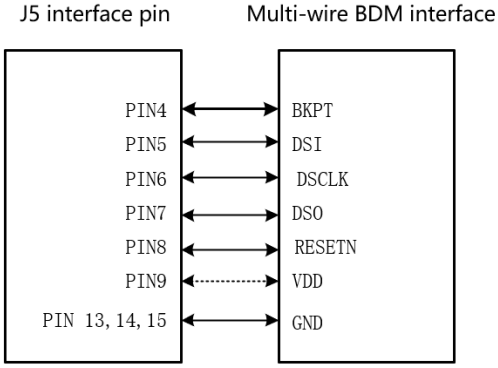



Figure 7.16: Connection between J5 interface and Multi-wire BDM interface

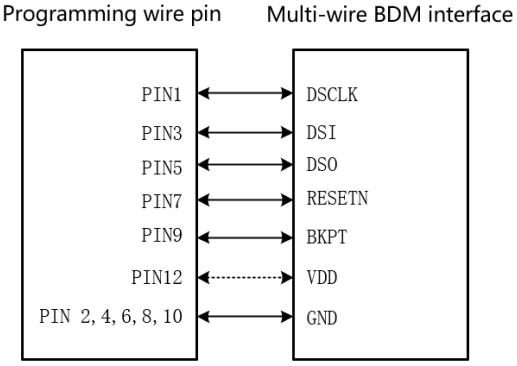



Figure 7.17: Connection between S1 programming wire and Multi-wire BDM interface

## 7.9 SPI Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and SPI programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and SPI programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

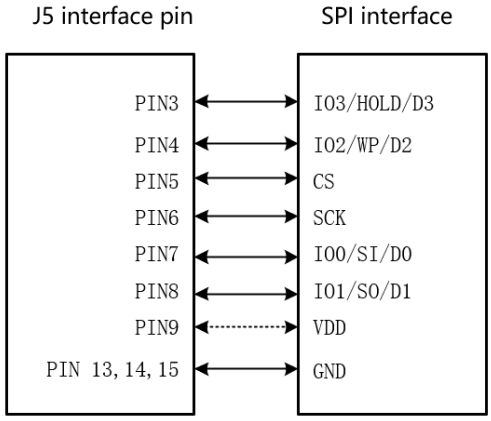



Figure 7.18: Connection between J5 interface and SPI interface

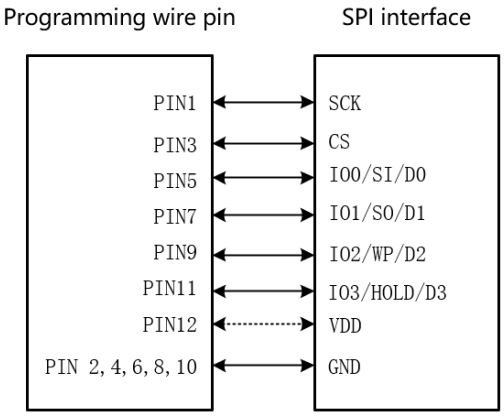



Figure 7.19: Connection between S1 programming wire and SPI interface

## 7.10 UART Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and UART programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and UART programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

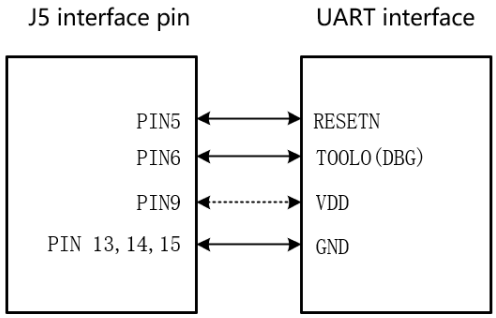



Figure 7.20: Connection between J5 interface and UART interface

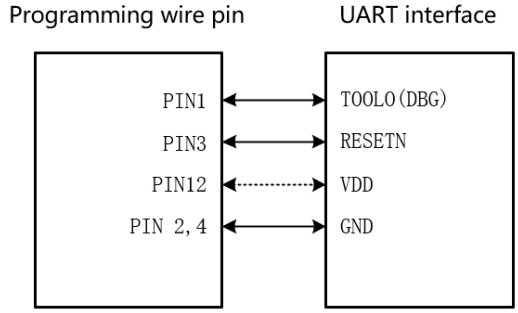



Figure 7.21: Connection between S1 programming wire and UART interface

## 7.11 SWIM Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and SWIM programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and SWIM programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

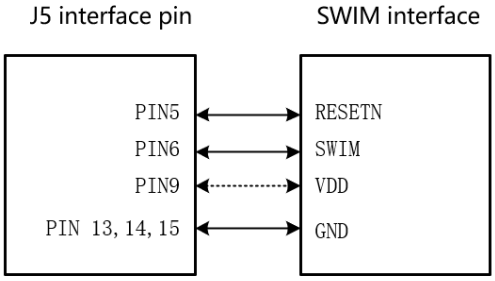



Figure 7.22: Connection between J5 interface and SWIM interface

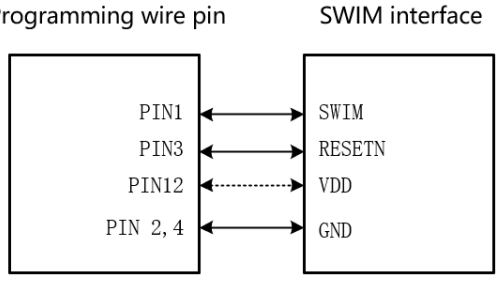



Figure 7.23: Connection between S1 programming wire and SWIM interface

## 7.12 PIC_ICSP Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and PIC_ICSP programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and PIC_ICSP programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

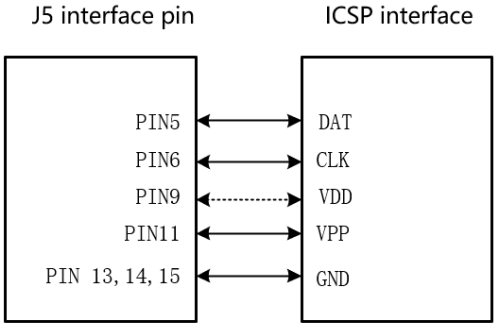



Figure 7.24: Connection between J5 interface and PIC_ICSP interface

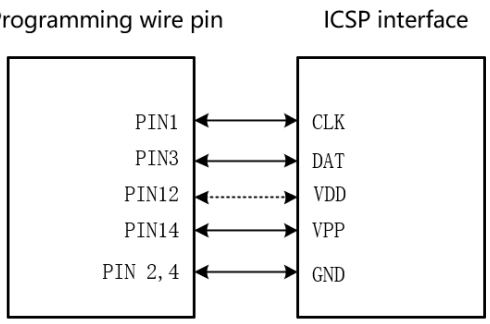



Figure 7.25: Connection between S1 programming wire and PIC_ICSP interface

## 7.13 IIC Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and IIC programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and IIC programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

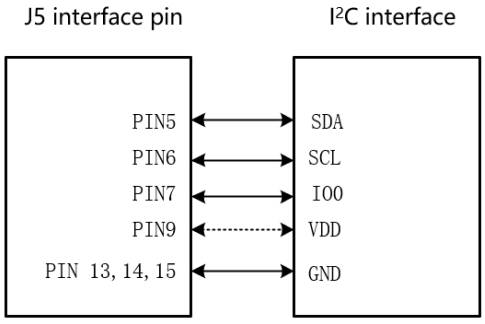



Figure 7.26: Connection between J5 interface and IIC interface

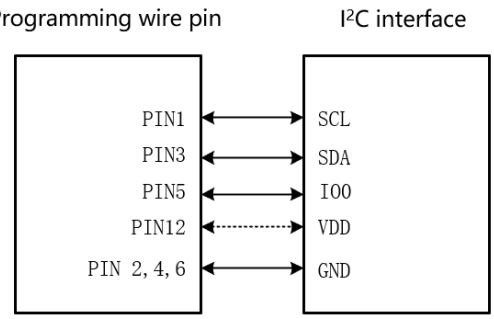



Figure 7.27: Connection between S1 programming wire and IIC interface

## 7.14 CSI Interface

Different wiring diagrams are designed for different chips, and the bottom left figure shows the connection between the J5 interface of the programmer and CSI programming interface of the target chip, and the bottom right figure shows the connection between the programming wire provided by the Company and CSI programming interface of the target chip.

Notes: If the target chip is not powered by the programmer, an external power is required. It is required to choose either an external power or the programmer power. That is, the target chip shall not be powered by both power sources at the same time.

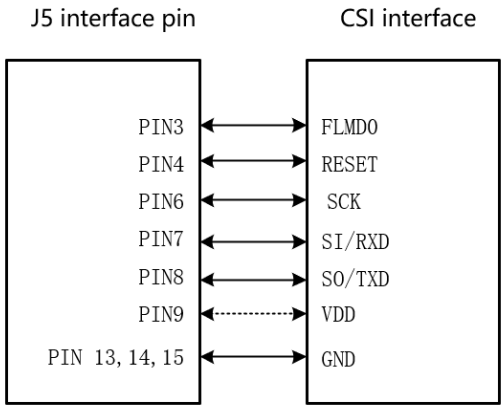



Figure 7.28: Connection between J5 interface and CSI interface

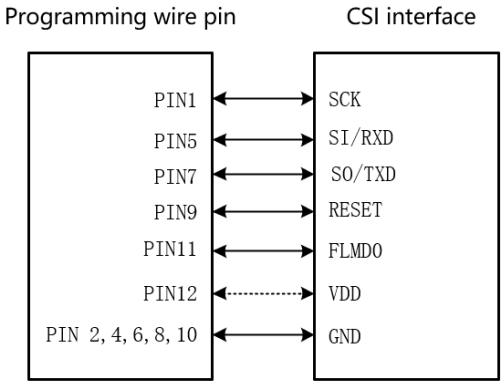



Figure 7.29: Connection between S1 programming wire and CSI interface

# 8 Use of DLL

In order to enable the programming function in the programs of users (such as test programs programmed in C, C#, C++, LabView, etc.), DLL files and a set of APIs are provided for users. For specific content, please refer to the document DLL User's Manual of OPTEEQ Series S In-system Programmer.

Please read files in the USB flash disk provided by the Company, and then double-click the S Series Gang-Programmer DLL Interface Library .

# 9 Offline Program

The programmer supports offline program, which means that the chip can be programmed without being connected to the computer. The programmer can perform offline programming by connecting the standalone programming accessories(S1).。

## 9.1 Standalone programming accessories

One end of standalone programming accessories(S1) is a 15-pin plug, which is used to connect to the "ATE" interface of the programmer. The other end is a press button, which is used to start offline programming.

Figure 9.1: Standalone programming accessories

## 9.2 Offline Program steps

After confirming that the programmer meets the offline programming requirements, please start the operation according to the following steps:

1. Supply power to the programmer. Please refer to the hardware connection to connect the power supply and network cable. The programmer will start to power on and perform the initial operation. After the initialization is completed, the "READY/ PASS/ Ready/Success" LED light on the burner lights up. The LED lights corresponding to "START", "FALL" and "BUSY" are all in the off state.
2. Add a programmer. Please refer to Programmer Addition in the OpteeQ software to add a programmer.
3. Connect the programmer. Please refer to Programmer Connection in the OpteeQ software to connect the programmer. The indicator light "LINK" of the programmer will turn green and remain constantly on.

4. Offline programming project.The offline programming project is the project file used during offline programming. It has a fixed name "EXTER00". After the Settings are completed, all channels will program this project. There are two ways to generate an offline programming project:

   - Create a new project as an offline programming project.
     (a) Please refer to Project Creation in the OpteeQ software to create a project named "EXTER00". The project name is case-insensitive and cannot be modified.
     (b) Sending project. Please refer to Project Sending in the OpteeQ software and send the project "EXTER00" to the programmer.
   - Treat the existing project as an offline programming project. On the home page of the OpteeQ software, check the programmer, click on "Manage" in the OpteeQ software, select the project and right-click to choose "Set as offline project", generating a new project named "EXTER00".

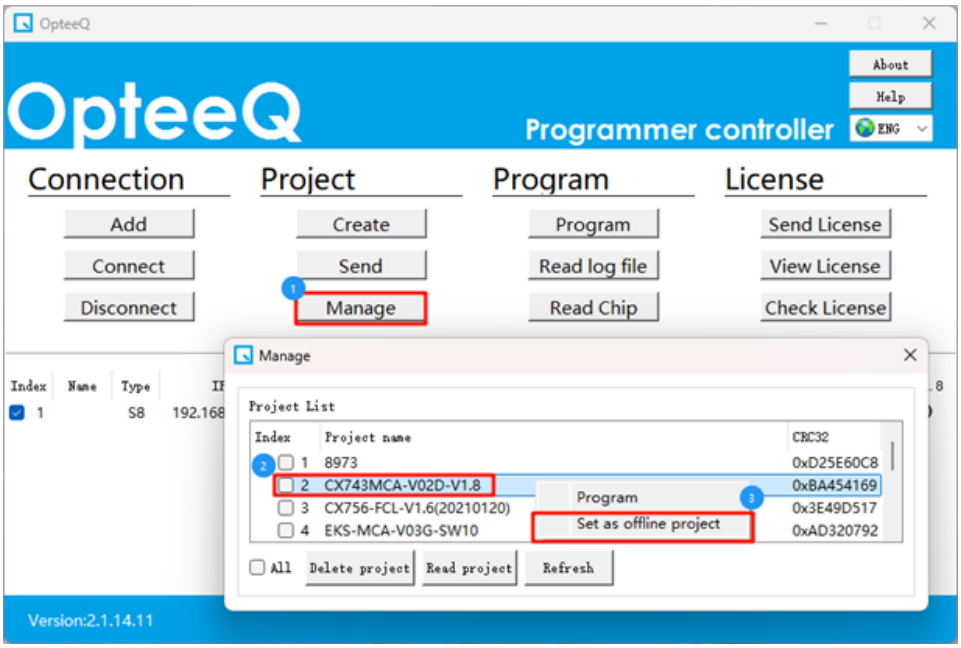



Figure 9.2 Set as offline project

5. Disconnect the programmer. On the home page of the OpteeQ software, check the programmer, click "Connection > Disconnect", disconnect the connection, and the programmer indicator light "LINK" will turn red and remain constantly on.

6. Connect the programmer to the standalone programming accessories. Connect the 15-pin plug of the offline programming component to the "ATE" interface of the programmer.

7. Start programming. Press the press button of the offline programming component to start the offline programming. The programmer indicator light "BUSY" turns red.

8. The programming process is complete.

   - If the programming is successful, the programmer indicator light status will change from "READY" to red and constantly on.

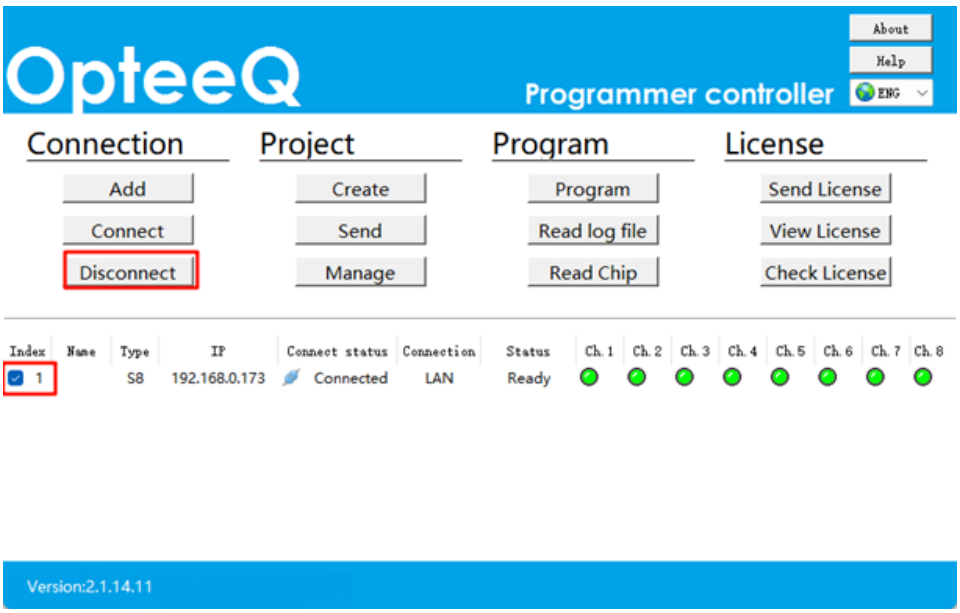



Figure 9.3 Disconnect

- If the programming fails, the status of the programmer indicator light will be "FAIL", which remains red and constantly on. After the programming fails, you can connect the programmer to the OpteeQ software, check the logs and confirm the cause of the failure.

# 10 Announcements

- Please complete the connection of hardware circuits before turning on the power to avoid damage to the hardware.
- Non-professionals are not allowed to disassemble the shell. In case of special needs (such as the need to embed the programmer into a specific device), please contact technical support personnel.
- Do not use the programmer in high-temperature and humid environment. Please keep the programmer away from water and dust, and prevent physical collision.
- Please do not modify or crack the software and hardware of this product without authorization. In case of any hardware modification or software cracking by users, it is deemed that users give up their rights to enjoy after-sales services and support provided for this product. Furthermore, OPTEEQ Technologies does not bear any consequences for the losses due to hardware modification or software cracking by users.

# 11 Help and Support

## 11.1 Contact Information

For any problems or questions when using this Manual or our products, please contact us for help. Our contact information is as follows:

- Tel.: 0510-81813667
- Website: www.opteeq.com\en
- E-mail: contact@opteeq.com

For any questions or suggestions, please call our technical support hotline. We will provide you with necessary services and support.

## Contact us


- Tel.: 0510-81813667
- Website: www.opteeq.com\en
- E-mail: contact@opteeq.com