PB600GUI

PB600-MT6511 User Guide

Features and Advantages

- Wide Power Supply Range: DC 12V-48V
- R&D based on ARM Microcontroller Platform
- USB or RS232 Communication Interface
- Provides High Current 5V Power Port for Chips
- Kelvin Power/Output Signal Measurement Method
- Connecting the Chip to the Programmer Using Shielded Ground Wire
- Single-Line Communication Interface and 16-Bit ADC with Output Pin Multiplexing

Applicable chips

- MT6511CT Full Range
- MT6511GT Full Range

Overview

The PB600 Programmer is a brand-new generation of chip programmer introduced by MagnTek, developed on the ARM platform based on the Cortex-M3 core. The programmer integrates a voltage stabilization circuit, microcontroller circuit, and signal AD sampling circuit internally. The programmer is powered by an external power adapter, which can be a DC output power adapter with a voltage range of 12V-48V and a power of 12W or more. Communication with the programmer can be achieved through either USB or RS232, providing flexibility to meet user preferences. Shielded and grounded cables are used for signal transmission between the programmer and the chip to mitigate external interference. The programmer is designed with a dedicated grounding path, allowing it to be connected to the device's ground to further enhance its resistance to interference during operation.

Table of Contents

1 Programmer Hardware Components

The PB600 Programmer Kit consists of the programmer host, power adapter, USB cable, Ethernet cable, and Ethernet port adapter board.

Documentation, software, and drivers can be downloaded from our official website under 'Applications' > 'Technical Support' > 'Evaluation Boards and Programmers.' When downloading, please choose the corresponding host software based on the chip model you are using.
Direct Link：http://www.magntek.com.cn/list/196/

Figure 1.1 PB600 Host

Figure 1.2 12V Power Adapter

Figure 1.3 Shielded Ethernet Cable

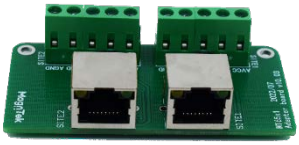


Figure 1.4 Ethernet Interface Adapter Board

Figure 1.5 USB Connection Cable

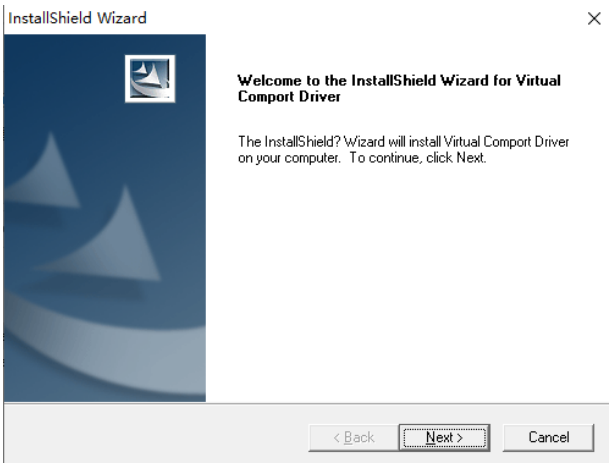
Figure 1.6 is a complete set of physical drawings connected when the programmer is used.

Figure 1.6 Full set of programmer connection diagram

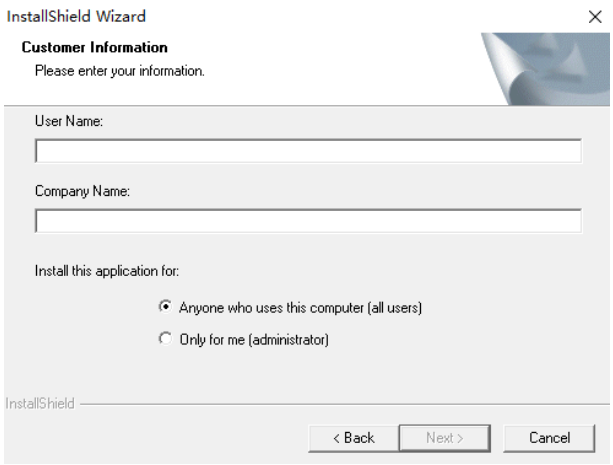
2 Software Installation

2.1 Driver Installation Instructions

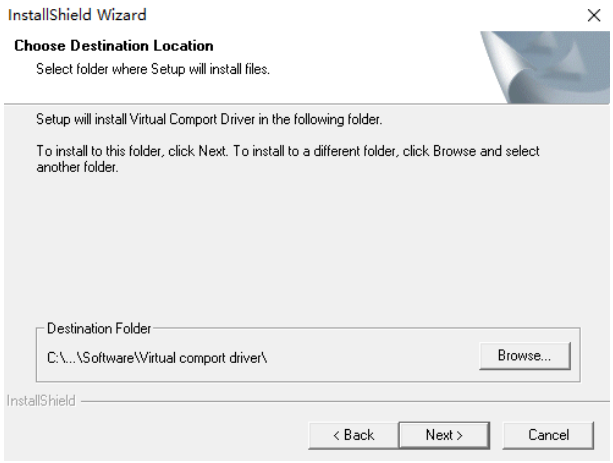
- Extract the downloaded 'VCP_V1.5.0_Setup_W7' file compression package.
- Depending on the actual configuration of your computer system, choose the 32-bit or 64-bit .exe file and double-click to run for driver installation. In special cases, right-click and choose to run as administrator may be required.
- After the file is read, the following interface will appear. Click 'Next' to continue.



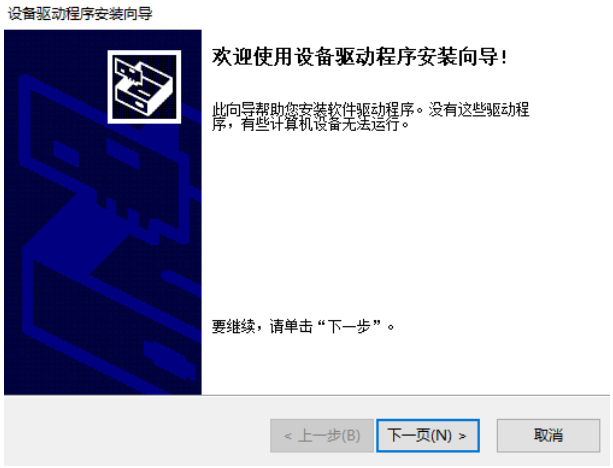
- After filling in the information, select 'All Users' and click 'Next' to continue.



- Choose the installation path and click 'Next' to proceed.

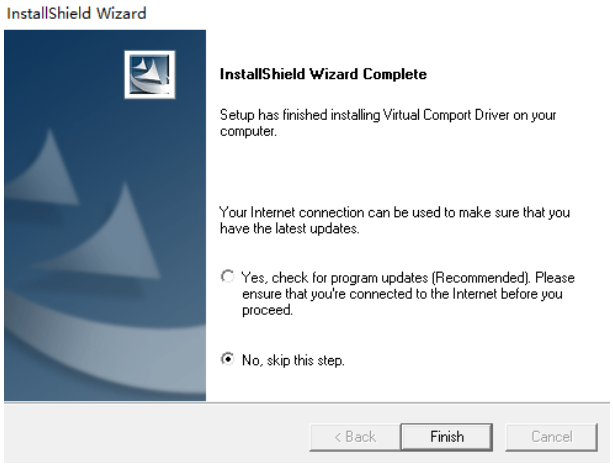


- Wait for the installation. After some time, an additional window will pop up as follows. Click 'Next' to continue.



- After the installation is complete, click 'Finish' to close the current window.

- Navigate back to the main installation window, select the 'No' option, and then click 'Finish' to complete the driver installation.



- After the installation is complete, turn on the main power switch of the programmer. Connect the programmer to the computer using the USB cable. You can check whether the driver is installed successfully by navigating to 'My Computer -> Management -> Device Manager -> Ports (COM and LPT)' (Figure 2.1).

- Depending on your computer configuration, choose to install 'VCP_V1.5.0_Setup_W7_x86_32bits.exe' (XP/WIN7/WIN10-32bit) or 'VCP_V1.5.0_Setup_W7_x64_64bits.exe' (WIN7-64bit/WIN10). For Win10 32-bit and below systems, it is recommended to use the former file for installation, and it is preferable to run it in 'Run as Administrator' mode.

- If the drivers installed by both files cannot run properly, it is recommended to try the above steps on a different computer. Alternatively, you may contact our company for collaborative troubleshooting.

Figure 2.1 Driver Successfully Installed and Connected to the Programmer

2.2 Software Installation

- The recommended software operating environment is Windows 7 and above with .NET Framework 3.5, 512MB or more RAM, 2GB or more of hard disk space, and a display monitor and graphics card that support 1024 × 768, 60Hz or higher.
- Unzip the downloaded file compression package.
- Open the 'Volume' file in the folder and extract its contents.
- Double-click the 'setup.exe' file in the folder to initiate the installation process. The installation steps can be referred to the following process:
- 1、choose the folder location for installation and click “Next”.

Figure 2.2 Select Installation Path

2、Click Next to continue

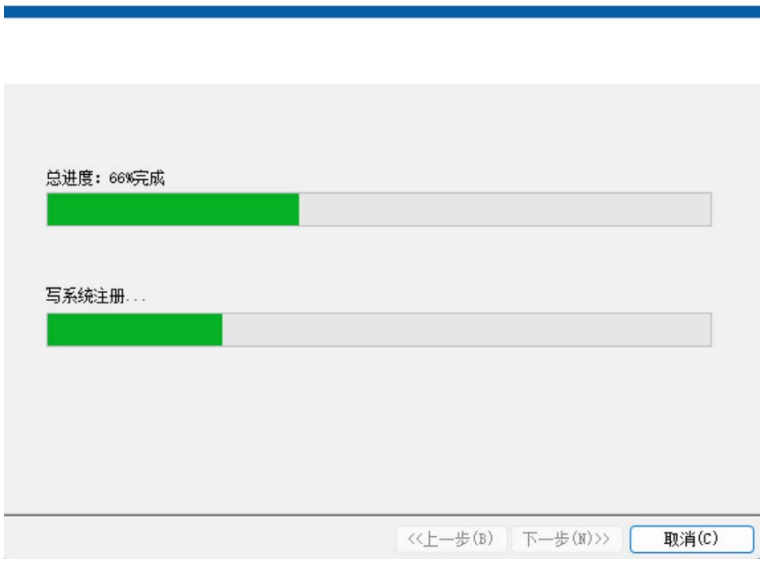


Figure 2.3 Installation Progress

- 3、Wait for the installation to complete, then click 'Finish' to exit. The software is now successfully installed.

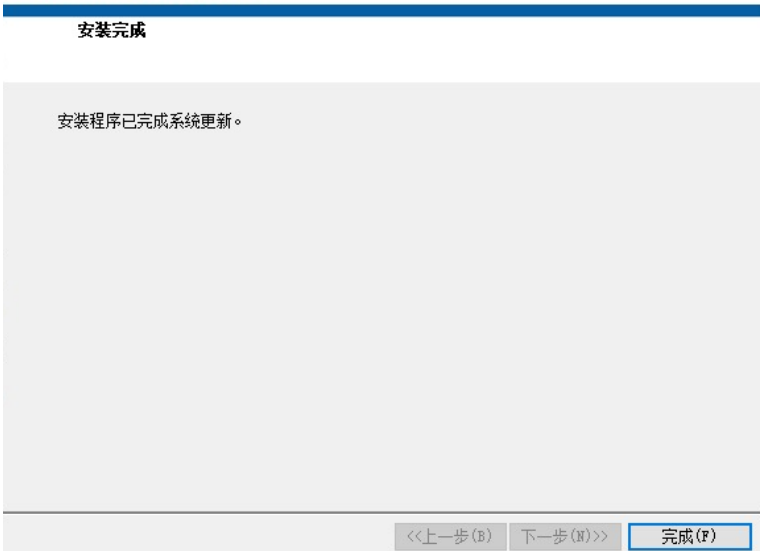


Figure 2.4 Installation Completed

- Open the PB600_MT6511GUI file in the folder and unzip it.
- Double-click the PB600_MT6511GUI.exe file to open the programming software interface.

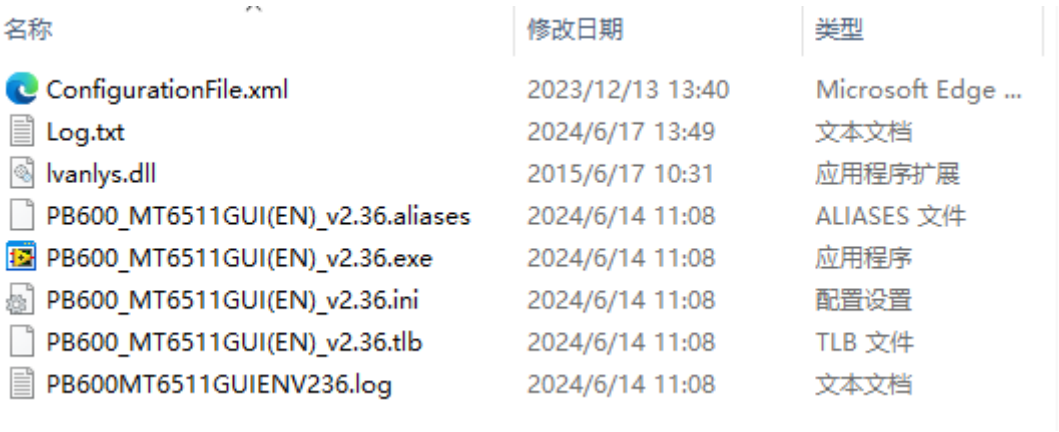
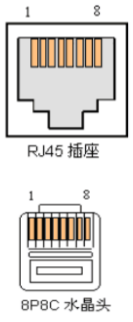


Figure 2.5 Executable File and Configuration File

3 Programmer Hardware Connection Diagram

The PB600 programmer can simultaneously support single-chip programming (programming of 1 MT6511CT chip), dual-chip dual-power mode programming (programming of 2 MT6511CT chips simultaneously, or programming of 1 MT6511GT chip in dual-power supply mode), and dual-chip single-power mode programming (programming of 1 MT6511GT chip in single-power supply mode). There are three programming modes available.

"The programmer is powered by an external 12-48V power adapter, with a minimum recommended use of a 12V1A power adapter to ensure the normal operation of the programmer (the complimentary power adapter provided by our company is 12V5A). The programmer communicates with the PC via a USB cable. The connection between the programmer and the chip uses a shielded Ethernet cable. For early-stage debugging or manual programming in small quantities, you can use the Ethernet cable connected to the provided Ethernet port adapter board and then to the chip, making it more convenient for chip replacement and debugging. However, for automated programming devices, it is strongly recommended to directly connect the Ethernet cable to the chip interface (or aviation plug) to improve the reliability of programming, removing the intermediate Ethernet port adapter board. Table 3.1 below provides the PB600 programmer's Ethernet interface and crystal head wiring definitions, and SITE1 is consistent with SITE2."



Pin No.	Wiring definition	Harness color
1	Connect chip OUT pin	
2	Common ground terminal	
3	Chip power supply terminal measuring pin	
4	Chip ground terminal measuring pin	
5	Common ground terminal	
6	Common ground terminal	
7	Chip power supply terminal power supply	
8	Common ground terminal	

Table 3.1 Definition of Programmer Network Port and Crystal Head Line Sequence

Attention should be paid to the automated programming device: The recommended maximum length for the USB cable is not to exceed 1 meter (without a shielding ring) or 1.5 meters (with a double-ended shielding ring). The maximum recommended length for the network cable is 1 meter, and it should have a shielding layer and an independent grounding wire. The routing of USB cables and network cables should be kept away from devices such as power adapters, computer power cords, stepper/servo motor power lines, and drag chains that have high voltage (above 24V) or high-current interference. The USB cable and network cable provided in our programmer kit are both 1 meter long, equipped with a shielding layer and an independent grounding wire. Moreover, these cables are

customized for anti-interference. Therefore, it is strongly recommended to use the provided cables. Otherwise, in a more complex production environment, there may be programming data interference leading to poor chip (sensor) programming or testing results.

If the automated equipment is a combined programming/testing device and requires series-connected relays to switch the connection of the chip's OUT pin, it is strongly recommended to connect the wiring of the chip and programmer to the normally closed circuit of the corresponding relay (i.e., the circuit when the relay is in a non-energized state).

In manual programming debugging, it is important to note that the maximum recommended length for wiring from the interface end of the Ethernet port adapter board to the chip end (sensor interface) (as shown in the diagram with red/black/blue and green lines) should not exceed 20 centimeters; It is recommended to use shielded wires for better programming effectiveness. The shielding layer of the shielded wire should be grounded at one end, and the other end should be connected to the independent ground screw of PB600 while simultaneously connecting to the device ground. Similar to USB cables and network cables, it is advised to keep this signal shielding wire away from devices such as power adapters, computer power lines, power lines for stepper/servo motors, drag chains, etc., that may have high voltage (above 24V) or high current interference.

The top of the PB600 programmer's casing (metal shell) features a dedicated grounding screw. In environments where there are significant interference factors, such as multiple large devices operating simultaneously in the same room, it is recommended to connect the grounding screw of the programmer to the ground of the programming environment for better performance.

The diagram in Figure 3.1 illustrates the hardware connection for the PB600 programmer when connecting to two MT6511CT chips (or a single MT6511GT chip in dual power supply mode). This diagram represents a manual debugging connection schematic when using the Ethernet port adapter board.

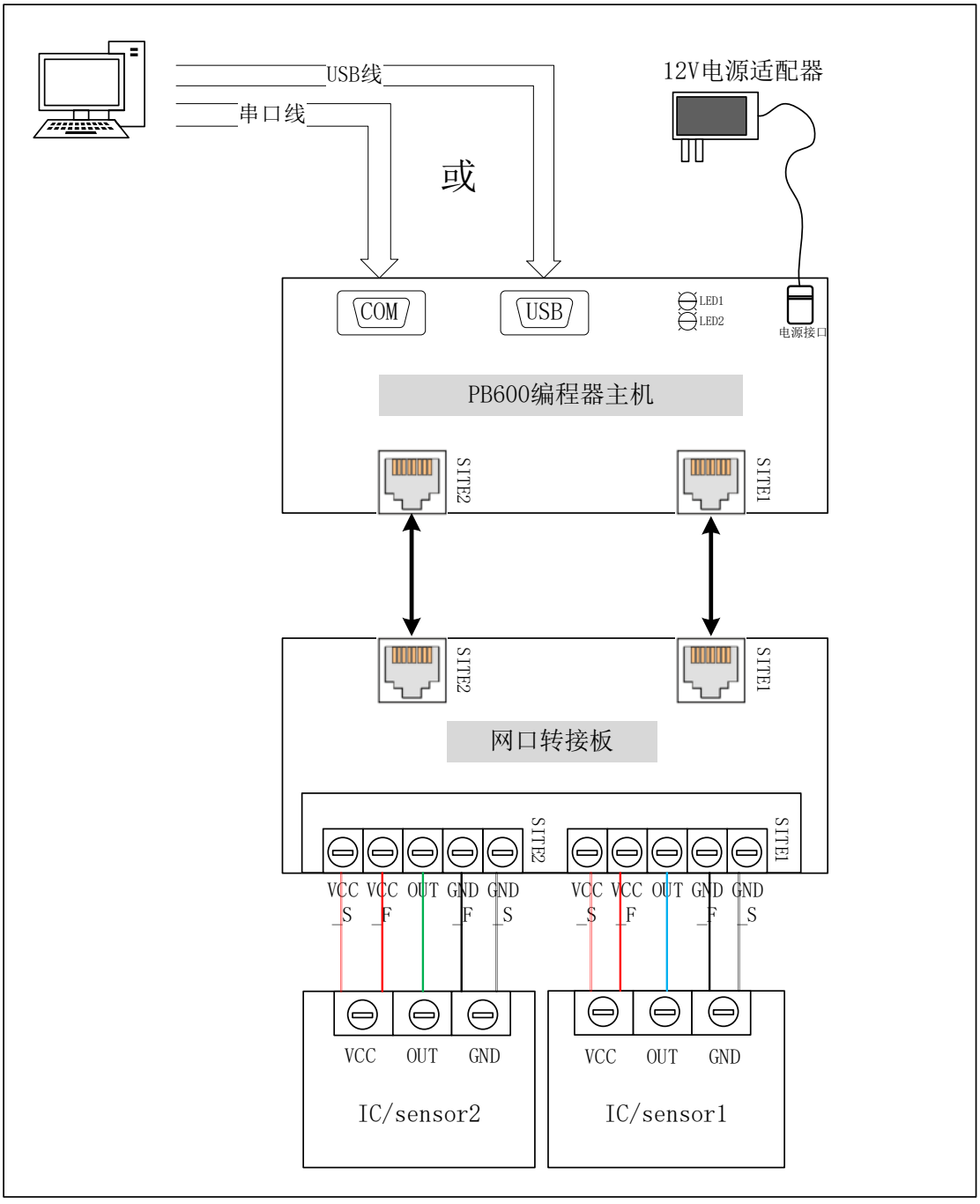


Figure 3.1 Schematic diagram of wiring between PB600 programmer and 2 MT6511CT (or 1 MT6511GT) chip

Figure 3.2 depicts the hardware connection diagram for the PB600 programmer when connecting to a single-power-supply MT6511GT chip. This diagram serves as a manual debugging connection schematic when utilizing the Ethernet port adapter board.

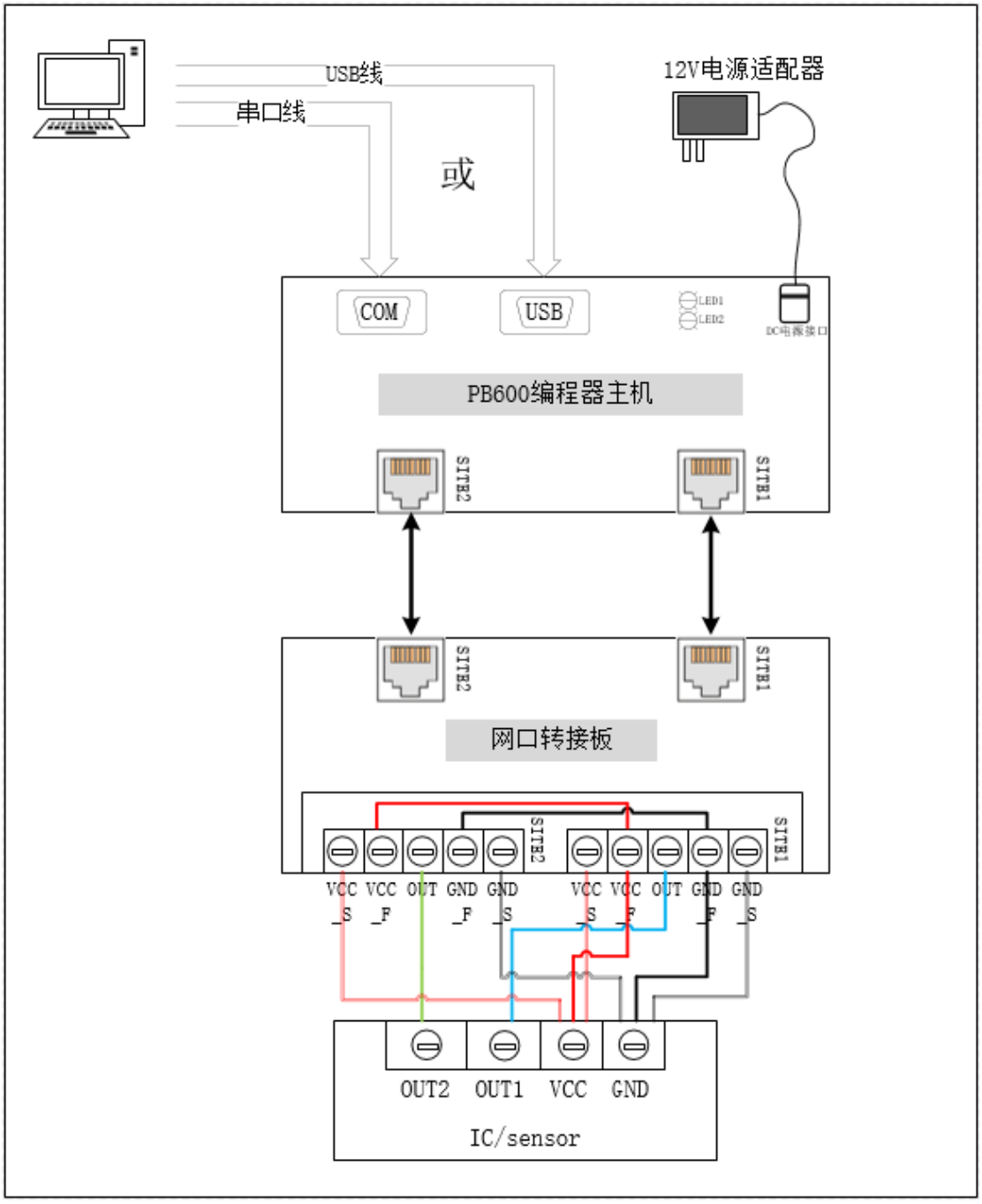


Figure 3.2 Schematic diagram of connection between PB600 programmer and MT6511GT chip powered by a single power supply

4 Software Interface

Here is an introduction to the usage of the programming interface software for the MT6511GT chip. For specific parameter meanings, please refer to the product datasheet corresponding to this chip.

4.1 Boot Interface

- Double-click to open the installed software, and you will enter the chip selection interface. In this interface, manually select the programming interface based on the model of the chip you intend to program.

Figure 4.1.1 Programming interface selection

- Click on the text such as 'Dual-Chip' or 'Analog Output' in Figure 4.1.1. In the drop-down menu, select either 'Single-Chip' or 'Dual-Chip' options. After selecting the corresponding output mode, click the "OK" button to enter the programming interface accordingly.

- Figure 4.1.2 shows the dual-chip analog output chip programming interface. The interface includes analog output general programming interface, 17-point programming interface and chip parameter read-only interface.

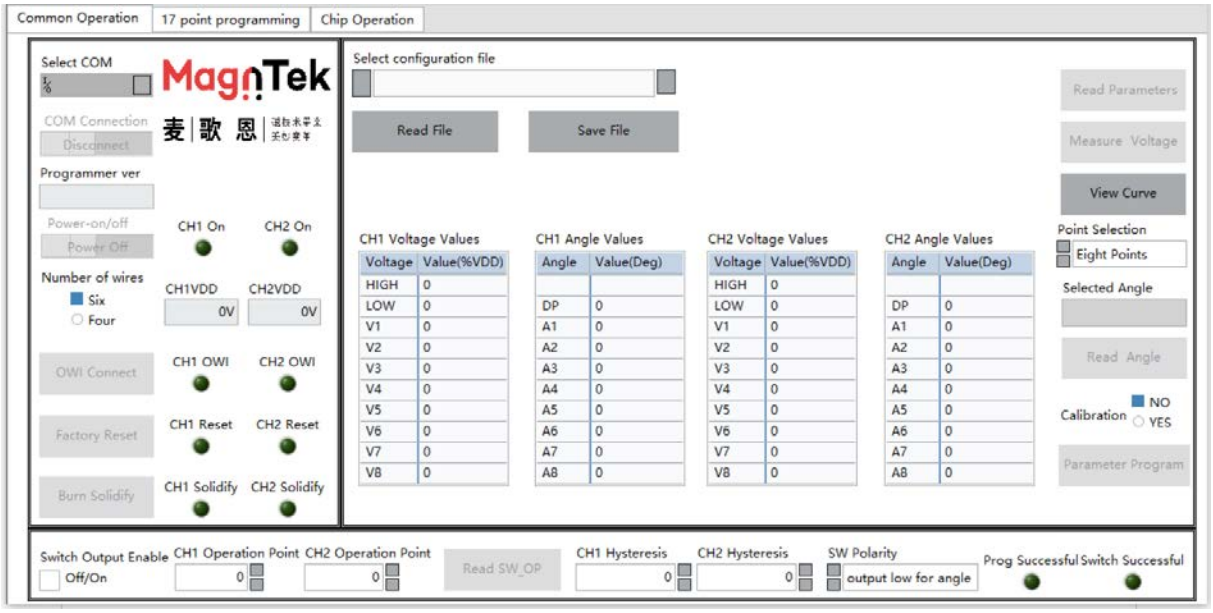


Figure 4.1.2 Programming interface of two analog output model chips

4.2 Common operating interface

The commonly used operations in this interface include programming port connection, chip power on/off, OWI communication connection, factory reset, import/export of parameter configuration files, programming options for points 1-4, and programming of switch signal parameters.

- Click on the "Select Serial Port" and choose the correct serial port number. After that, click the serial connection button below to establish communication between the upper computer software and the programmer. Once connected correctly, the firmware version of the currently connected programmer will be displayed in the control box below. If there is an abnormal connection or if the connected programmer does not match the current chip, an error prompt box will appear.

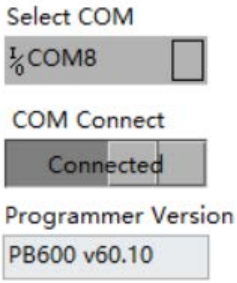


Figure 4.2.1 Serial port selection and connection

- Once the serial port is successfully connected, clicking on the "Chip Power On/Off" button allows you to power on or off the chip. The power-on button includes operations for powering on the chip and measuring the VDD voltage at the chip terminals. When the connection is normal, the actual measured power voltage values (in volts) will be refreshed in the "CH1VDD" and "CH2VDD" boxes on the right side. If there is an abnormal connection, attempting to power on the chip will trigger an error alert window, and the chip power will be automatically turned off.

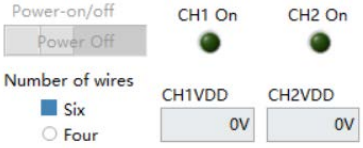


Figure 4.2.2 Chip power button and indicator

- The line number selection allows you to choose between four lines and six lines. Four lines represent the chip connection in a dual single-power-supply configuration, while six lines represent the chip connection in a dual dual-power-supply configuration. For specific wiring methods, you can refer to the information provided in the third chapter above.

- Clicking the "OWI Connect" button establishes the communication link between the chip and the programmer. However, it is important to ensure that the chip is correctly connected to the programmer interface and that the selected line number on the interface matches the hardware before clicking the button. Otherwise, there may be an OWI connection exception or other warning prompts. The "CH1OWI Connect" and "CH2OWI Connect" indicator lights on the right side of the button are used to indicate whether the chip is currently in OWI communication status. When the hardware circuit is properly connected, these indicator lights will light up sequentially after clicking the "OWI Connection" button.

Figure 4.2.3 OWI button and indicator

- Clicking the "Restore Factory Settings" button clears all parameters in the user-programmable area of the chip to the factory state. This allows users to start programming anew or troubleshoot programming issues. This button is not necessary under normal circumstances.The two LED indicator lights on its right side show whether this operation is completed. Note: This operation only refreshes the values in the chip's RAM to the factory settings, which will be lost upon power-off. To solidify this operation's result into the ROM, the "Write and Solidify" operation must be performed.

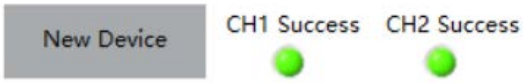


Figure 4.2.4 Factory reset button and indicator

- Clicking the "Burning and curing button" button executes the write and solidify operation. This operation solidifies the values set after restoring factory settings into the chip's ROM to achieve non-volatile storage. Once the solidification is complete, the indicator lights will light up sequentially. This process takes approximately 3-6 seconds. Note: This operation is specific to the parameter saving step mentioned above ("Restore Factory Settings") and does not apply to multi-point programming parameters. In mass production mode, these two functions are not necessary; this feature is primarily intended for debugging during the early stages of development.

Figure 4.2.5 Burning and curing button and indicator light

- The selection of configuration profile options allows for the import/export of parameter configurations for the multi-point programming of the user interface. To use this feature, you need to first click on the right side of the address bar to select the file access path. After confirming the path, you can proceed with the subsequent import/export operations. Clicking the 'Read Profile' button will populate the interface with parameters from the file corresponding to the above link address. Clicking the 'Save Profile' button will save the parameters for multi-point programming in the interface to the file specified by the above link address, overwriting the original content of the file.

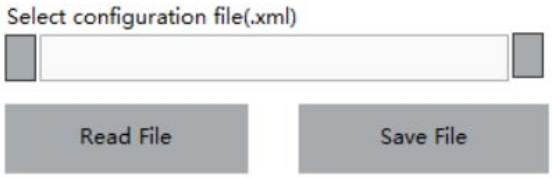


Figure 4.2.6 Read/Save configuration button

- In Figure 4.2.7, there is a multi-point programming parameter input box. The content in this box can be manually entered with programming parameter values based on output requirements or filled in with a single click from a configuration file. The "HIGH" in this box specifies the maximum value of the output signal, while "LOW" specifies the minimum value of the output signal. The "DP" value defines the breakpoint angle value of the chip, indicating the point where the chip returns from the maximum output value to the minimum output value during forward rotation (or from the minimum output value to the maximum output value during reverse rotation). The parameters "V1" to "V8" define the output voltage values corresponding to the angle positions of chips "A1" to "A8". The unit for voltage value parameters is %VDD, where the maximum value is 100 (exclusive) and the minimum value is 0 (inclusive). The unit for angle value parameters is degrees, where the maximum value is 360 (exclusive) and the minimum value is 0 (inclusive).

CH1 Voltage Values

Name	Value(%VDD)
HIGH	0
LOW	0
V1	0
V2	0
V3	0
V4	0
V5	0
V6	0
V7	0

CH1 Angle Values

Name	Value(Deg)
DP	0
A1	0
A2	0
A3	0
A4	0
A5	0
A6	0
A7	0

CH2 Voltage Values

Name	Value(%VDD)
HIGH	0
LOW	0
V1	0
V2	0
V3	0
V4	0
V5	0
V6	0
V7	0

CH2 Angle Values

Name	Value(Deg)
DP	0
A1	0
A2	0
A3	0
A4	0
A5	0
A6	0
A7	0

Figure 4.2.7 Multi-point programming parameter input box

- The slope parameter is used for programming scenarios involving single-point slope, and it only needs to be set before reading the angle value of A1 with programming voltage parameters. The unit for this parameter is %VDD/degree. Note: The chip itself does not

have a slope parameter; this parameter is an intermediate parameter generated for programming convenience. Ultimately, the parameters for two-point programming are calculated theoretically by the interface software and written into the chip. Therefore, for the chip, it essentially involves two-point programming.

Figure 4.2.8 The slope parameter for single-point slope programming

- Click the "Read Parameters" button to read the multi-point programming parameters in the ROM of the chip and display them on the interface for error checking.

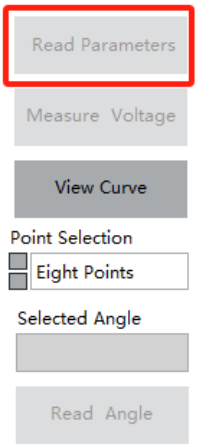


Figure 4.2.9 Function button to read the saved parameters of the chip

- Clicking the "Measure Output Voltage" button will open the measurement interface. At this point, the programmer disconnects from the communication with the chip and enters ADC measurement mode. The measurement results are displayed in both voltage values (V) and %VDD formats, with a refresh rate of 10Hz on the interface. The real-time values are shown on the left vertical bar chart, while the oscilloscope view on the right displays the trajectory of changes. Users can inspect the results as needed.

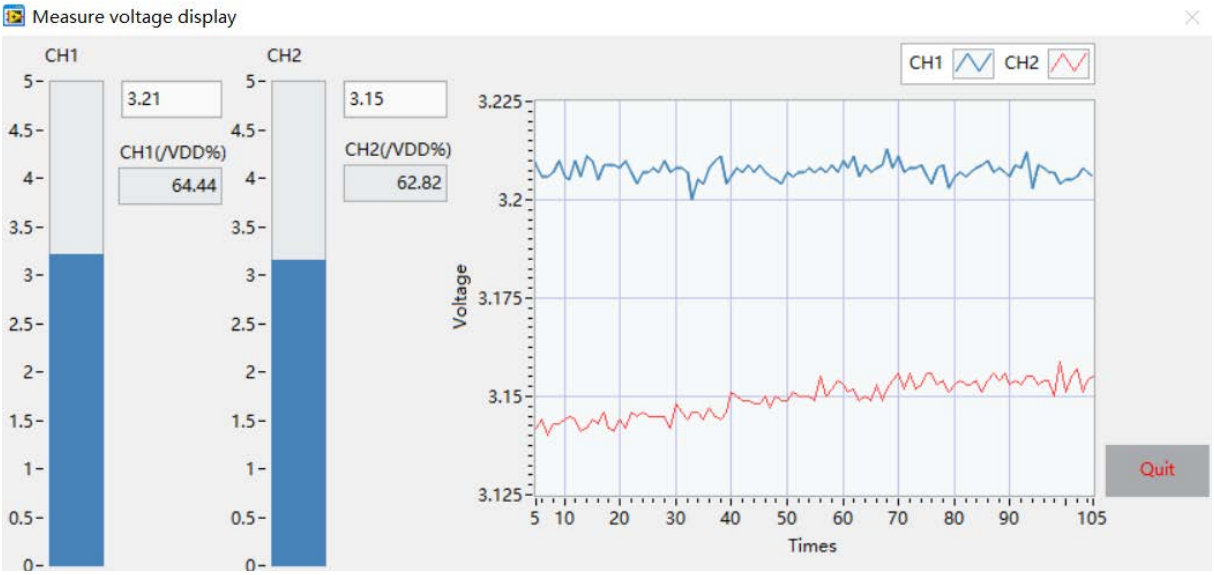


Figure 4.2.10 Output measurement interface

- Clicking the "View Programming Effect Chart" button allows you to see the theoretical curve graph corresponding to the input values in the current programming parameter box. This curve graph only reflects whether the parameter settings are correct and reasonable. The actual output of the chip is influenced by the direction of the magnet's rotation and the magnetic field conditions. Therefore, this graph is limited to early-stage debugging and reference purposes.

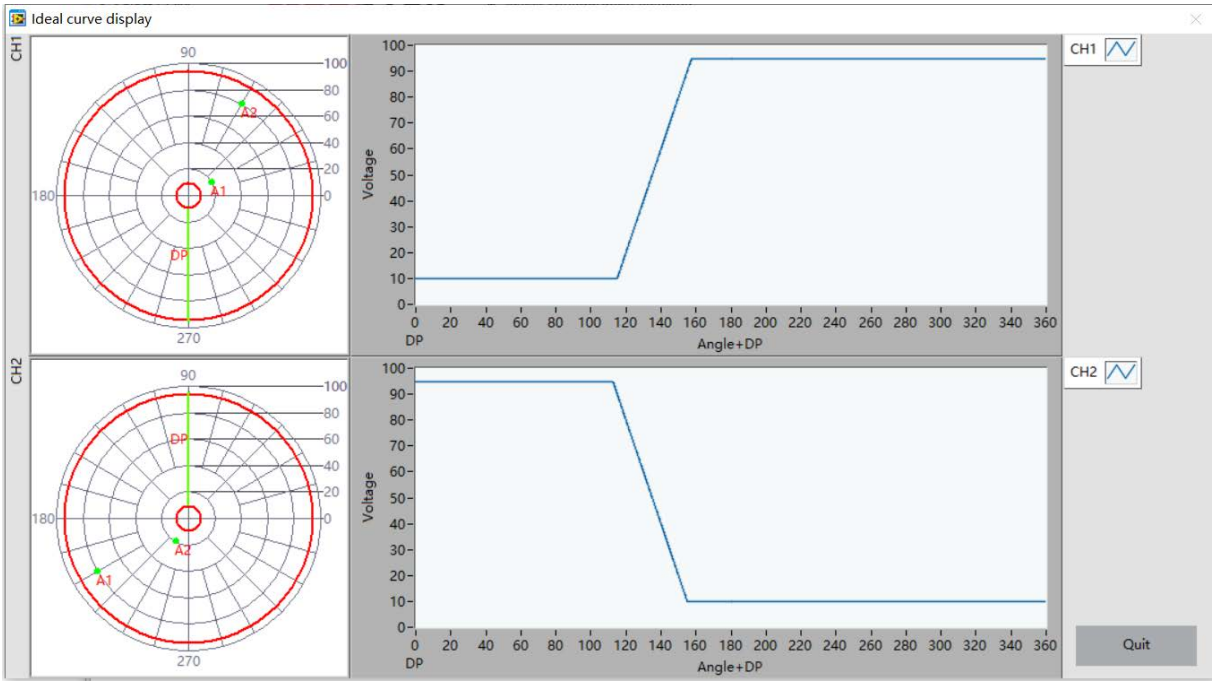


Figure 4.2.11 Theoretical programming curve diagram

- Clicking the dropdown menu for "Programming Point Selection" allows you to choose the number of programming points to start with. The parameters in the input box, including

voltage and angle values, will also adjust accordingly to the selected quantity. This feature helps prevent accidental errors by aligning the parameters with the chosen number of programming points.

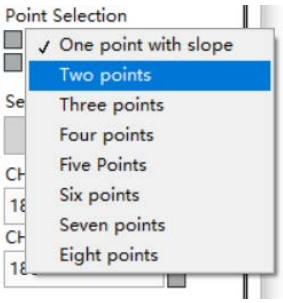


Figure 4.2.12 Programming points selection

- Clicking on the input box corresponding to "CH1 Angle Value" will display the current "Selected Angle Name" on the right side. In Figure 4.2.13, when the cursor is in the "DP" point box corresponding to "CH1 Angle Value," the right side will show that the currently selected angle is "DP." Clicking the "Read as Selected Angle" button at this point will prompt the programmer to read back the current angle value of the chip, add the corresponding "DP offset" value, and fill it into the "DP" box for CH1 Angle Value. Similarly, you can perform angle reading operations for "A1," "A2," and so on. Note: Only when the active cursor is within the options corresponding to "CH1 Angle Value" will this option be selected and updated in the "Selected Angle Name" box on the right. When the active cursor is in "CH2 Angle Value," it will not change the content in the "Selected Angle Name" box. Also, when the selected angle name is "DP Angle Value," the content displayed in the input box is the current angle value of the chip plus the offset set in the interface (if greater than 360°, subtract 360°). When the selected angle name is any other multi-point programming angle, the displayed angle value in the input box is the current angle value of the chip.

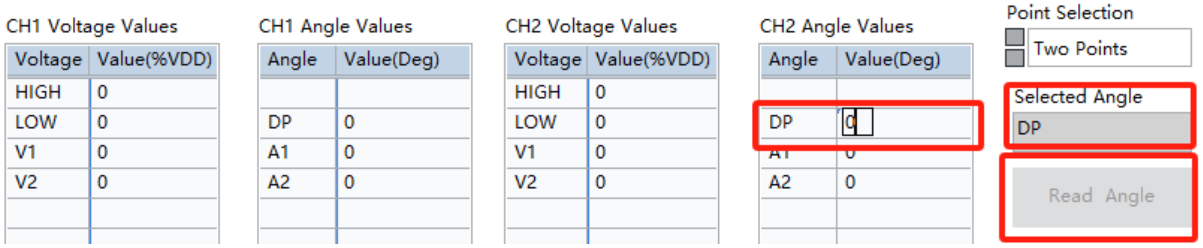


Figure 4.2.13 Read Angle operation

- Clicking the "Write Parameter Programming" button will initiate the solidification operation for multi-point programming parameters. This operation involves writing the parameters of multi-point programming into the chip's EEPROM to achieve power-off

preservation. Before burning, parameters with "DAC calibration" and parameters without "DAC calibration" can be selected for burning. The uncalibrated parameters are interface parameters directly converted into the corresponding format and then written into the chip, while those with DAC calibration will start the DAC calibration process first, match the calibrated results with interface parameters, and then write the matched results into the chip. The difference between the two is that the calibrated parameter contains the DAC output correction information to bring the output closer to the desired result, and this calibration takes 3-6 seconds, so it is recommended that users only enable this when the power supply is connected in series with a larger resistive device. Under ideal conditions (our company's official recommended circuit), the calibration has negligible impact on the actual output results, so it is recommended to select no DAC calibration after programming. After the parameters are successfully programmed, the indicator below will light up (Figure 4.2.15).

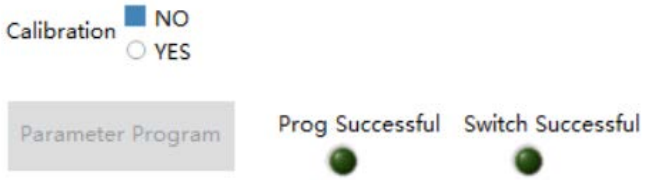


Figure 4.2.14 Multi-point programming parameter burning button

- Checking the switch output option allows the inclusion of programming parameters for switch signals during multi-point programming. The switch signal is independent of the analog output and is output on a separate pin from the analog/PWM signal, with its own dedicated pin. For specific details, please refer to the product specification document. Clicking the "Read Threshold Angle" button reads the current actual angle value of the chip as the threshold angle for the switch signal. When the magnetic field rotates in the positive direction and the angle exceeds the current threshold angle, the output signal transitions from a high level to a low level (assuming the default low-level polarity for the switch signal). Continuing to rotate the magnet, this output signal will flip back to a high level at the DP point. Detailed information on the relationship between chip switch signal output and the magnetic field can be found in the product specification document. The parameters "CH1 Hysteresis" and "CH2 Hysteresis" can be set to the hysteresis parameters for the currently set threshold. The range for this parameter is 0-22.5°, with a step size of 0.088°.

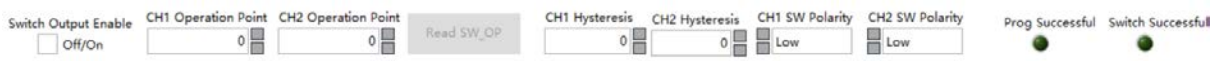


Figure 4.2.15 Switch output signal parameters

- In the PWM programming interface, there is a separate option for PWM waveform parameters, which includes configurations for output effective level and output frequency. Each parameter can be selected in the corresponding checkbox in Figure 4.2.16, and then written into the chip along with the multi-point programming parameters. For specific meanings and ranges of parameters, please refer to the product specification document released by our company.

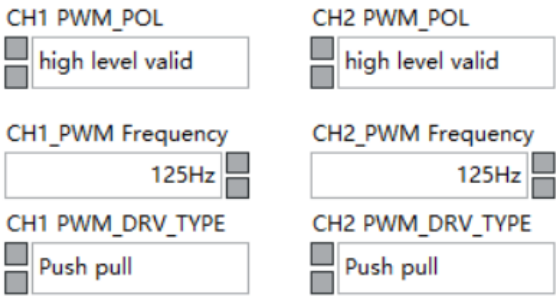


Figure 4.2.16 PWM parameter Settings

4.3 17-point Programming

The 17-point programming interface is used for manual debugging of 17-point programming parameters, the interface contains the configuration items of the output information parameters, the import/export of the parameter file and the burning button of the parameter. It is recommended that the interface is only used for debugging in the early stage of research and development, and the process is relatively complicated. Please use it in mass production. Lib libraries develop fully automated devices to implement this process.

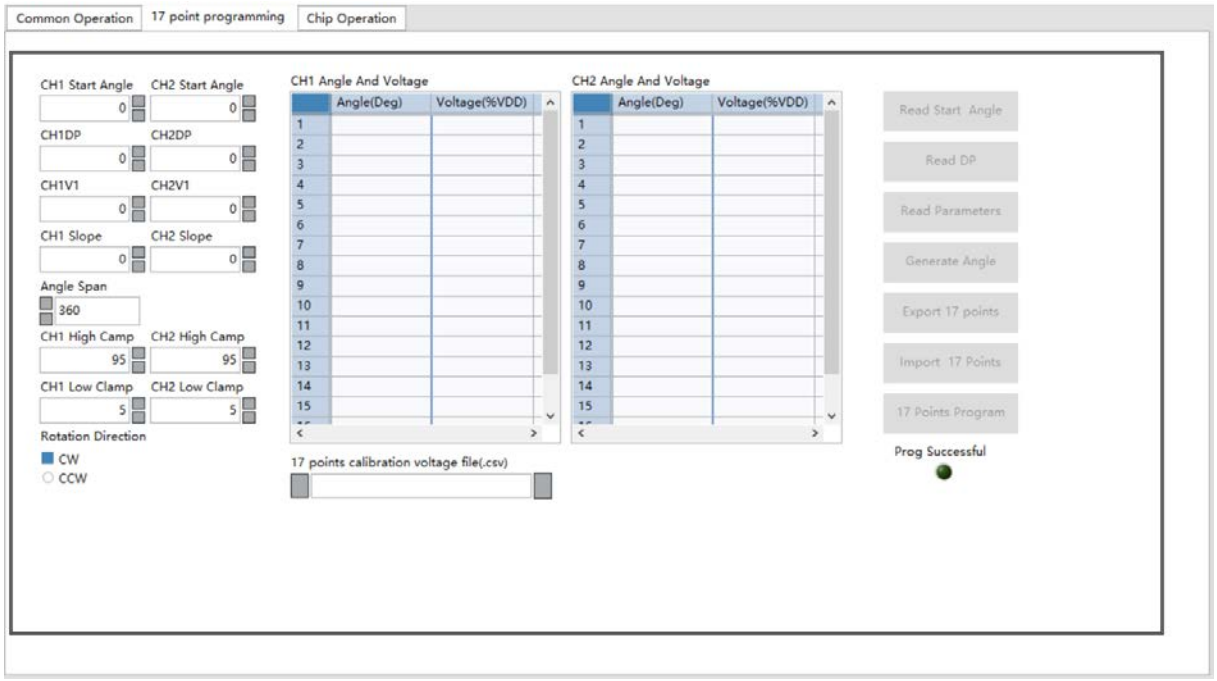


Figure 4.3.1 17 point programming

- The left side of the figure above is the general angle and voltage parameters, the format and range are consistent with multi-point programming, detailed refer to the above common operation interface content and this product specification.
- Click on 'Angle Span' that you can choose the angle span range corresponding to the 17-point programming interval, which 16 range ranges are available.

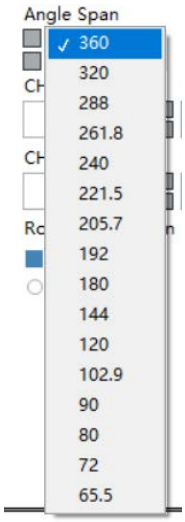


Figure 4.3.2 Angle Span

- The middle area shows the voltage corresponding to each equalizing angle. You can import the voltage from the file selected below. For details, see Chapter 5. procedure

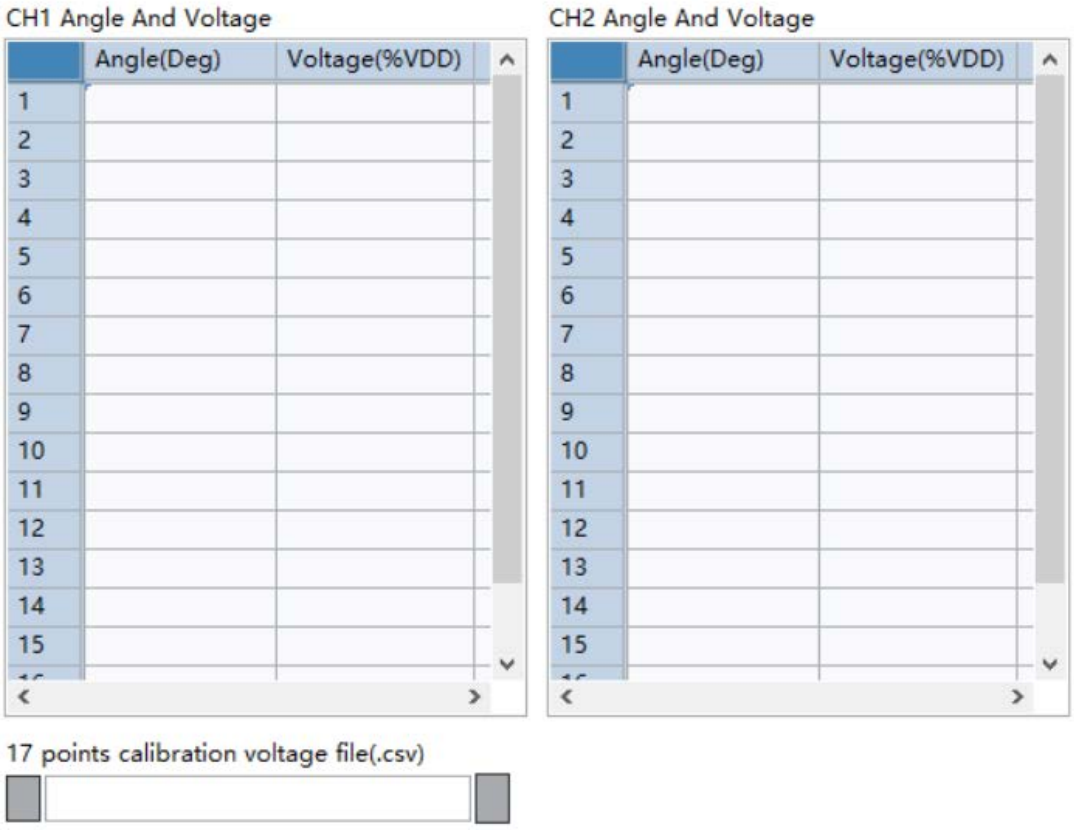


Figure 4.3.3 Programming parameter values

- The area on the left is the button for each operation
  - Click the "Read Start Angle" button to read the current chip angle and refresh it to the

corresponding input boxes of "CH1 Start Angle" and "CH2 Start Angle".

- Click the "Read DP Angle" button to read the value of the current angle plus 180°, and refresh it to the corresponding input boxes of "CH1DP" and "CH2DP".
- Click "Read Parameters" to read out the data stored in the current chip register and display it on the interface for debugging and traceability.
- Click the "Generate Angle" button to generate the corresponding voltage values of 17 angles.
- Click the "Import 17 Points" button to import the voltage value calculated in excel. The button function and the button function of generating voltmeter can be selected in actual use.
- Click the "17 Points Program" button to write the 17-point voltage parameter value into the chip and cure it. The curing time will be 3-6 seconds. After the programming process is over, the indicator light will light up.

Figure 4.3.3 Programming parameter value

4.4 SENT Output configuration

The SENT output configuration contains some basic configurations related to the SENT signal output. For details about the configuration settings, see section 5 "Software Operation". For the meaning of parameters, see "MT6511 Product Specifications" or "MT6511_User Manual SENT Protocol and Related Registers". Note: All the free input boxes here need to be filled in three hexadecimal numbers (such as' 05D '), less than three digits need to be manually filled in '0', otherwise there may display abnormal data programming error.

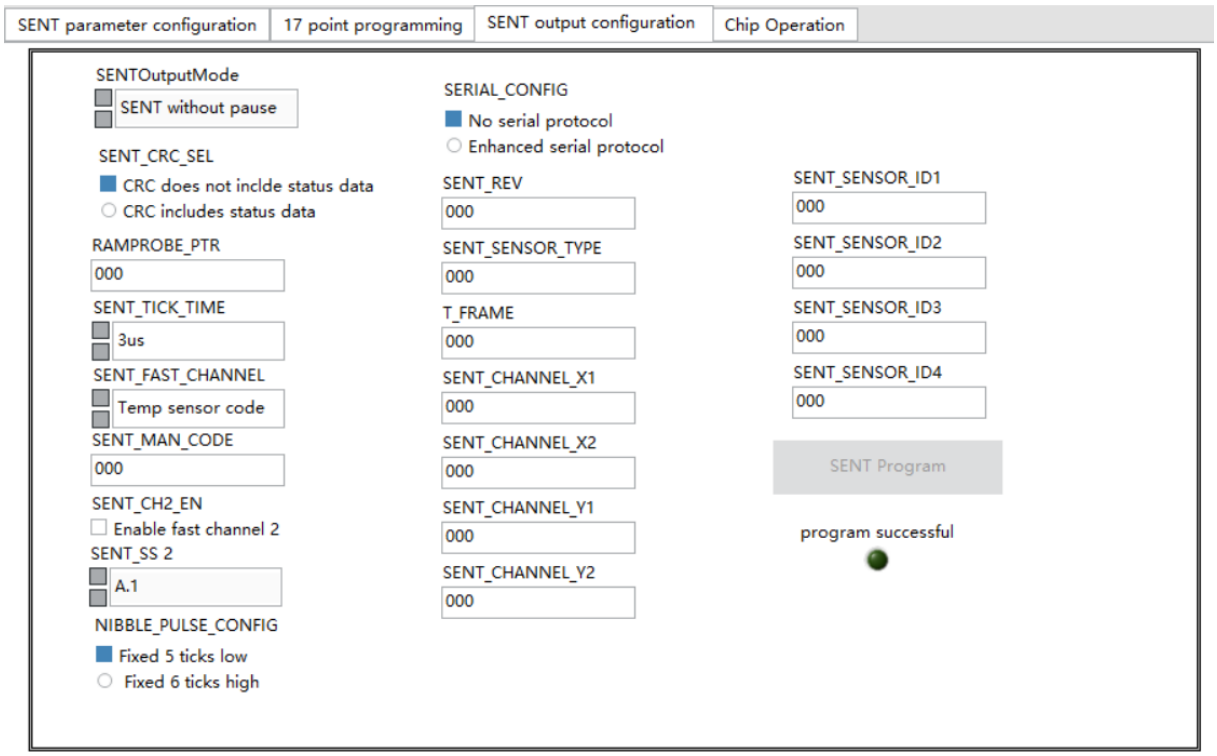


Figure 4.4.1 SENT output configuration

- After setting the parameters on the interface according to the specific output requirements, users can click the button "SENT Program" at the lower right corner, and the set parameters can be written into the EEPROM of the chip as a whole. The process takes 3-6 seconds. After the writing is complete, the indicator " program successful" at the bottom will light up, indicating that the programming is complete, and then the test can be carried out.

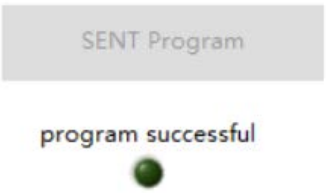


Figure 4.4.2 SENT program

4.5 Chip Operation

The Chip Information Reading interface contains the serial number information of the chip at the time of manufacturing and the chip's DAC calibration information. This interface provides read-only information, serving as a convenient reference for users during the early stages of development for debugging and for recording the programming status information of each chip during mass production. To operate on this page, it is necessary to first perform "Power On" and "OWI Connection" operations on the chip in the "Common Operation Interface." This interface's functionality can only be used when the programmer is in communication with the chip.

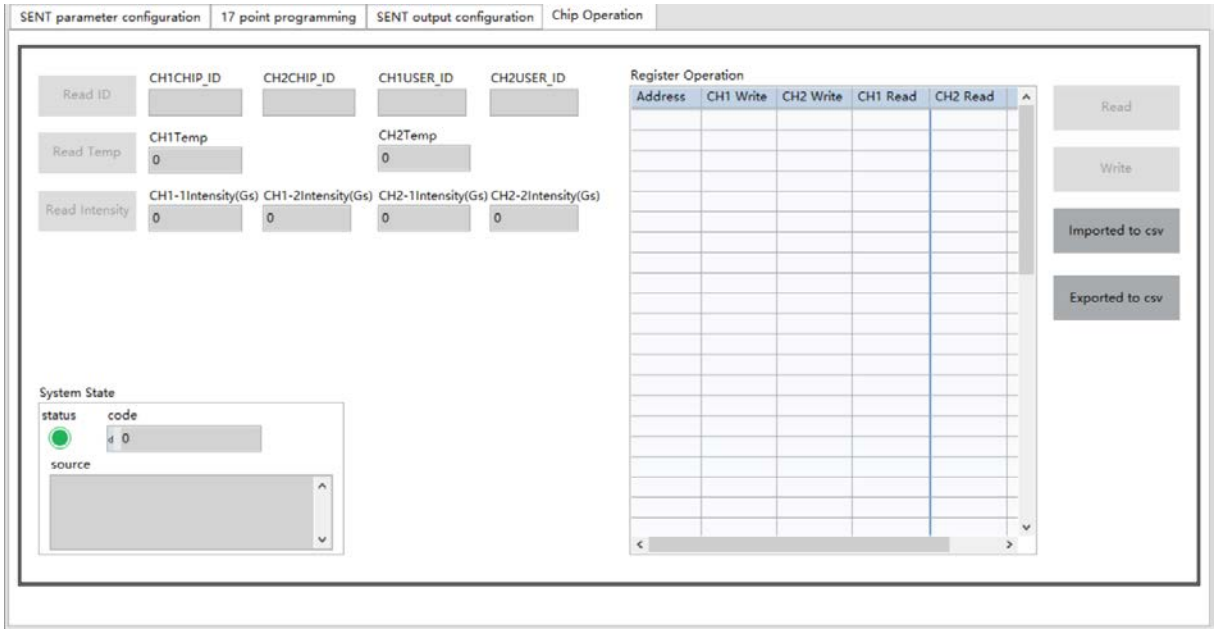


Figure 4.5.1 chip operation

- Clicking the "Read Chip ID" button retrieves the chip ID number. The "CHIP_ID" is the factory serial number of the chip, containing 48 bits of information. This serial number is a unified identification number assigned by our company during manufacturing and is currently read-only. Users can use it to record programming information for later traceability. For detailed explanations, please refer to the product specification document. USER_ID indicates the ID that a user can read and write. The value contains 16-bits of information. The information content can be defined by the user, which can be used to write fixed company information, classified management product models, product shipment traceability, etc.

Figure 4.5.2 Read ID

- Click the "Read Temp" button to get the value of the temperature sensor inside the chip. This information is mainly used for trial use in the early development and debugging phase. Due to product packaging structure and materials and other reasons, the temperature sensor and the real environment changes have a little lag, so it is recommended that customers increase the waiting time when doing the temperature change experiment to ensure the consistency of the internal temperature sensor and the external real environment temperature.

Figure 4.5.3 Read Temp

- Click the "Read Intensity" button to obtain the magnetic field strength information sensed by the chip in the current state. This information is the magnetic field information accepted by the magnetic induction element inside the chip under the current environmental state, rather than the surface magnetic information of the user magnet. The magnetic field information more truly reflects the current magnetic field environment of the chip, and the weak magnetic/strong magnetic alarm inside the chip is based on this information.

Figure 4.5.4 Read Intensity

- Click the "Read Alarm" button to get the current chip alarm status. The chip contains 12 kinds of alarm status information (please refer to the product specification for specific information and meaning). The function of the button is to light the "alarm occurs" indicator light on the right side when there is one or more alarms. If you need more detailed alarm information, please refer to this product specification or contact our technical personnel to complete the guidance.

Figure 4.5.5 Read Alarm

- Click the "Calibration" button to obtain the DAC calibration information, which is mainly used when operating the "Write Parameter Programming" button in Section 4.2 of this article. The information is read-only. When the "No DAC calibration" option is selected when writing parameter programming, this calibration data is meaningless.

Figure 4.5.6 Calibration

- The right-hand area of this page is the register read/write section. This section allows for arbitrary operations on values in the chip's RAM. All register addresses and data meanings are primarily based on what is specified in the product specification document. Customers are not allowed to modify the content of registers other than those explicitly opened in the specification document. If problems related to performance or functionality arise after modifications, the user is responsible for resolving them. Data in this table can also be imported/exported from/to a .CSV file by clicking the Import/Export button, which opens a file path dialog for the operation. Note: The input in this box must be in hexadecimal format, and the length must be 2 digits.

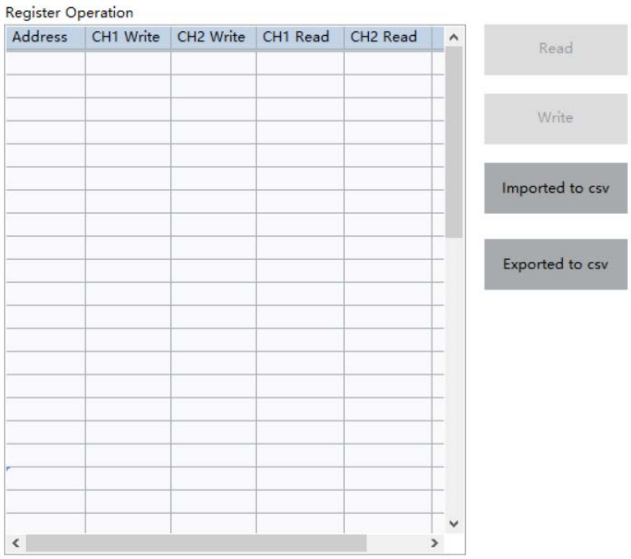


Figure 4.5.7 Register Operation

5 Software operation Examples

5.1 Simulate output single point plus slope programming operation

The following parameters are used as an example to introduce the programming operation of the software interface for the analog output of the MT6511GT chip single point plus slope parameter. The rest of the cases refer to the routine operation and the above software description.

Configuration parameter：CH1：Clamp_High=80%、Clamp_Low=20%、V1=20%、DP=10°，slope=0.8；CH2：Clamp_High=80%、Clamp_Low=20%、V1=80%、DP=190°，slope=-0.8。

1、 The programmer connects the 12V power adapter and turns on the programmer power switch, the programmer yellow light is steady on; Use USB to connect the computer to the programmer. The programmer has a steady green light.

2、 Connect the adapter board to the programmer interface using a network cable. Ensure that the adapter board is consistent with the chip model to be programmed, and that the programmer port SITE1 is connected to chip CH1 and SITE2 is connected to chip CH2.

3、 Double-click the "PB600GUI_MT6511.exe" file to open the software, and the screen for selecting the chip mode will pop up (Figure 5.1.1). Here, select the parameters of "dual chip" and "Analog output" and click "OK" to enter the mode programming interface (Figure 5.1.2).

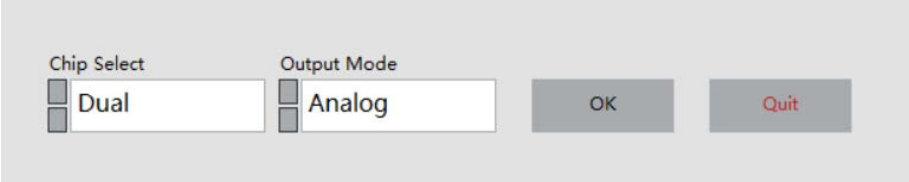


Figure 5.1.1 Chip Select

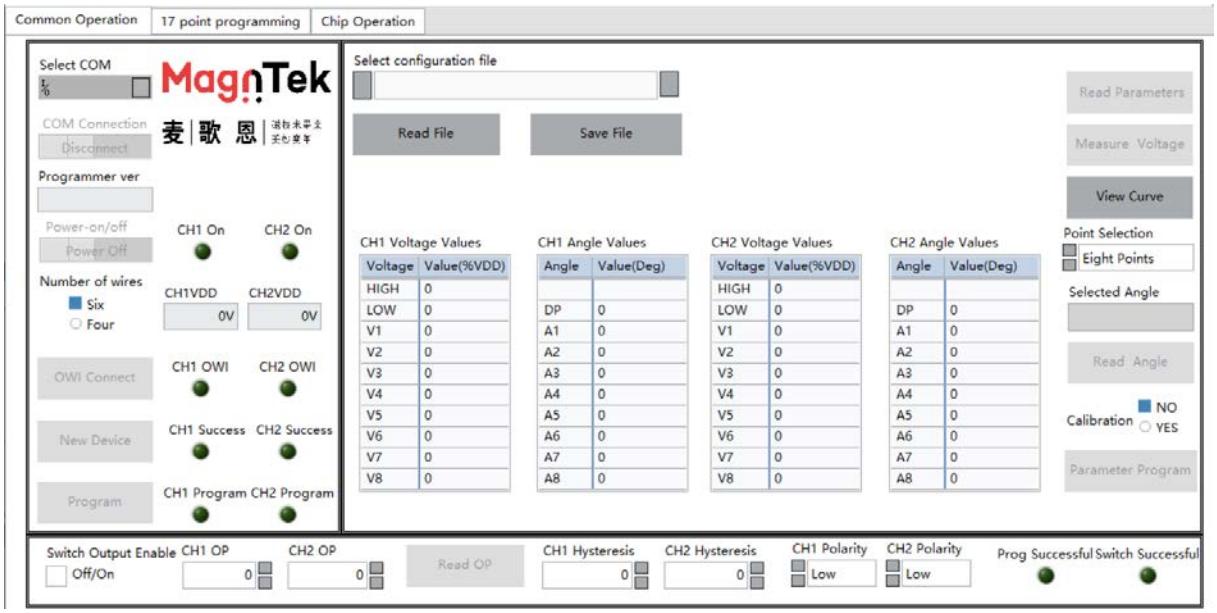


Figure 5.1.2 17 point programming

4、 Click the drop-down menu under "Select COM" to select the corresponding port number of the programmer (Figure 5.1.3). Click the "Disconnected" button under "COM Connect" to establish a communication connection between the programmer and the host computer (Figure 5.1.4). When the communication between the programmer and the host computer is properly established, the programmer returns the current firmware version number, which is displayed in the box corresponding to "Programmer Version" below (Figure 5.1.5).

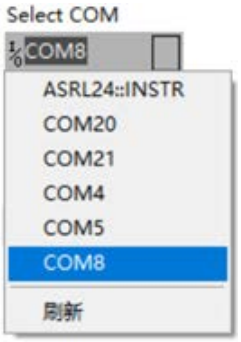


Figure 5.1.3 Select COM

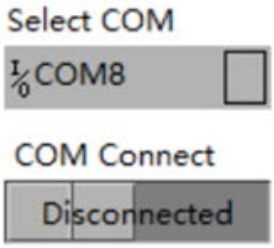


Figure 5.1.4 Click COM Connect normal connection

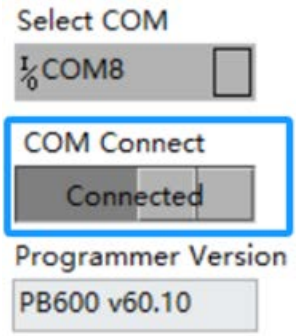


Figure 5.1.5 Status of the programmer after

5、 Click the button below "Power on" to power on the chip. When the chip is successfully powered on, the power indicator is green on (Figure 5.1.6); If the power-on fails, a pop-up window is displayed indicating that the power-on is abnormal (Figure 5.1.7). In this case, check the chip and hardware connections and try again.

Figure 5.1.6 Indicator light steady on

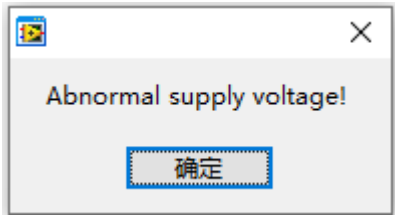


Figure 5.1.7 Alarm after exception

6、 Click the "Four" option under "Number of wires" and select the chip connection form (described in the hardware connection diagram in Chapter 3). Click the "OWI Connect" button to establish the communication connection between the programmer and the chip. When the programmer is connected normally, the programmer connection indicator will turn green (Figure 5.1.8).

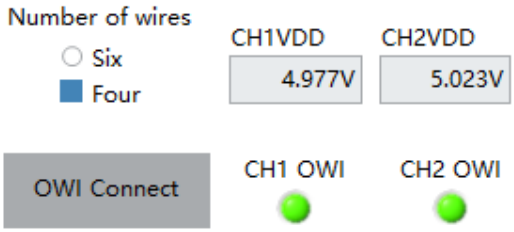


Figure 5.1.8 OWI Connect

7、 Click the "New Device" button to erase the original Angle programming data inside the chip. (If the chip is programmed for the first time, skip this step to simplify the procedure and save programming time.) After the erase is complete, the "CH1 Success" indicator turns green (Figure 5.1.9).

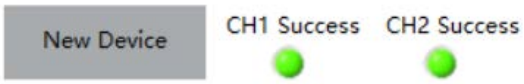


Figure 5.1.9 New Device

8、 Click the drop-down item under "Programming Points" and set it to "One point Slope".

9、 Enter the above parameters in the corresponding parameter field. 'HIGH', 'LOW', 'V1' and slope are fixed parameters, which remain unchanged during repeated programming after filling in. The 'A1' parameter is manually controlled and is the actual Angle value of the chip at present. The 'V2' and 'A2' parameters are the programming theoretical values calculated by the above parameters and will change with the change of 'A1' (Figure 5.1.10). Click the "Angle value" box corresponding to "DP" of CH1, set the magnet (sensor) Angle at about the middle of the entire travel, and click the "Read as Select Angle" button to read the current chip Angle value after stabilizing, and display the value of the current value plus 180° in the "DP" Angle value of CH1 and CH2.

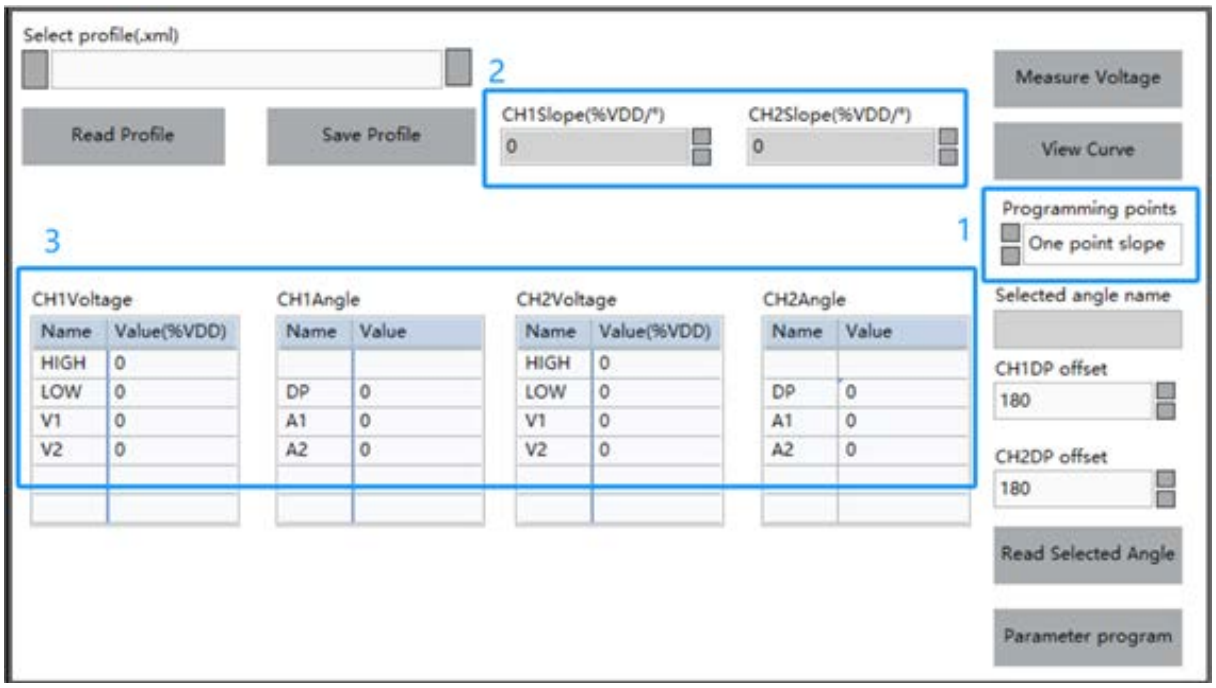


Figure 5.1.10 Select a point of slope programming and fill in the fixed parameters

10、 Click the "Angle value" box corresponding to "A1" of CH1, set the magnet (sensor) Angle to the first position that needs to be programmed, click the "Selected Angle" button to read the current chip Angle value after stabilization, and display it in the Angle value A1 of CH1 and CH2. The A1 Angle of the current read chip Angle CH1 is 91.17°. The A1 Angle of CH2 is 268.5°, while the host computer automatically calculates the voltage and Angle value of A2 point and fills in the corresponding position (Figure 5.1.11).

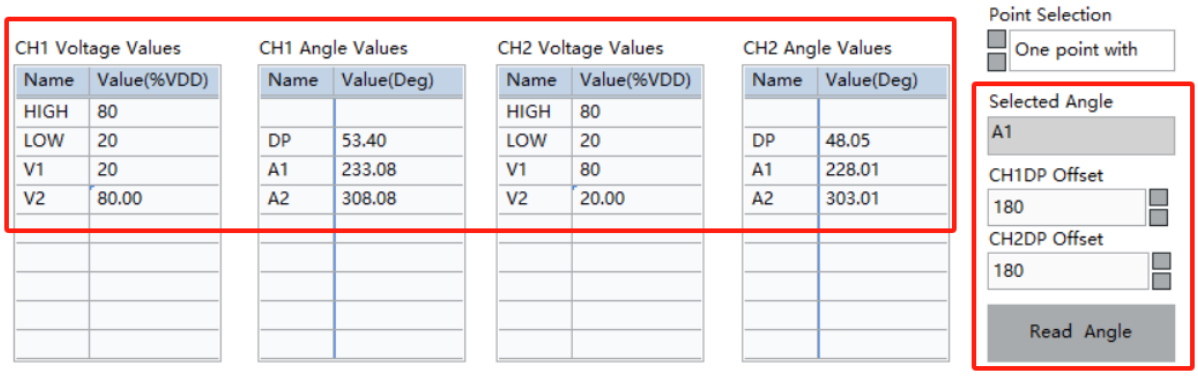


Figure 5.1.11 Set the A2 point automatically with the slope

11、 After the parameter configuration is complete, click the "View Curve" button to confirm whether the parameter Settings meet the expectations.

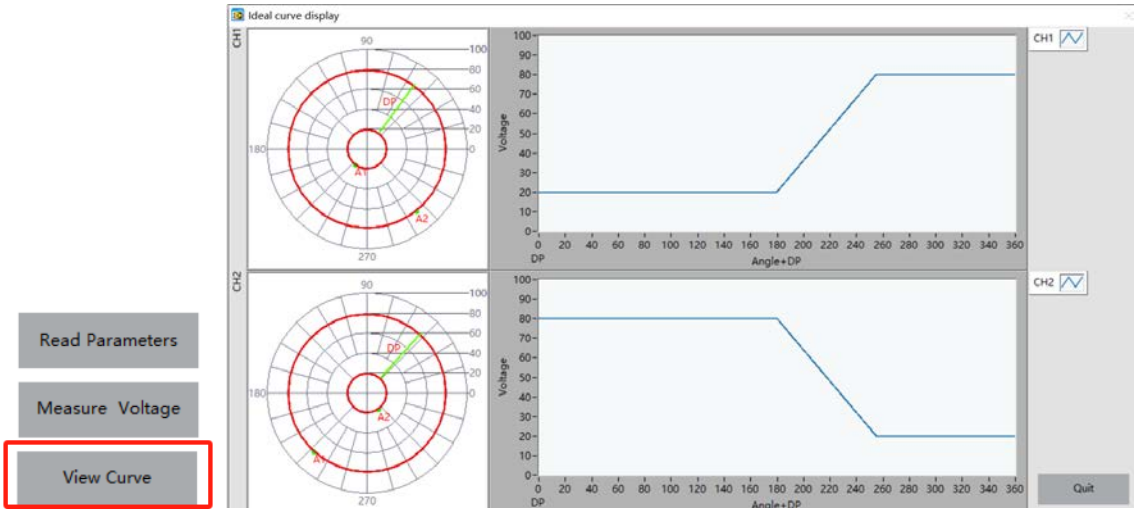


Figure 5.1.12 View Curve

12、 After confirming the completion, click the "Close" button, close the parameter effect window and return to the programming interface. Click the "Write parameter programming" button, write the above parameters into the chip, and cure them. The process takes 3-6s. If the process is successful, the host computer prompts "Programming success" and the indicator below "Program Success" lights up. If the connection fails, an error dialog box is displayed indicating Failed to "Programming failure". You need to confirm the connection and program the parameters again.

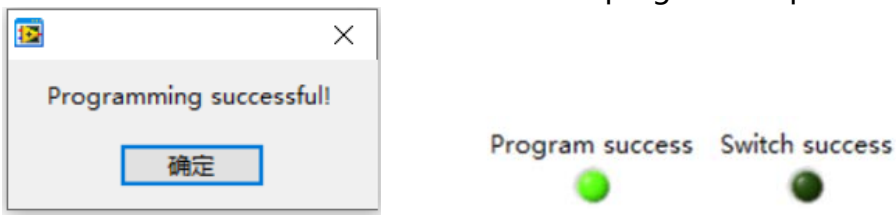


Figure 5.1.13 Programming successful

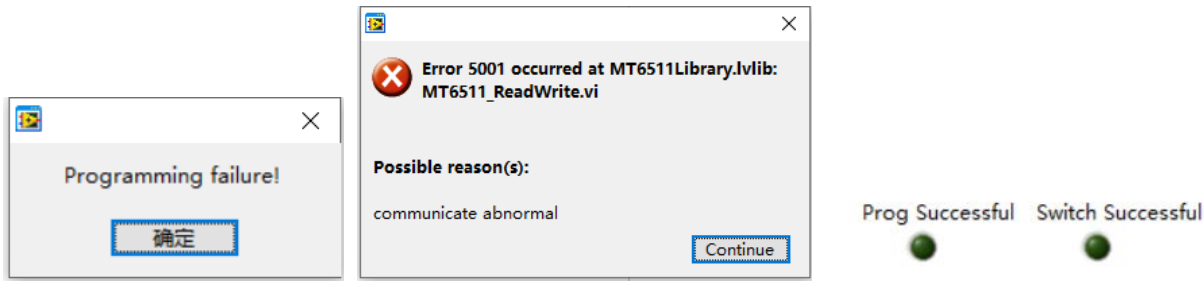


Figure 5.1.14 Programming failure

13、 After the programming is completed, click "Measure Voltage" to observe whether the output of the chip is wrong. If it is correct, click "Stop" to close the interface, click "chip power off", disconnect the connection between the programmer and the chip before you can remove the chip for further testing or use.

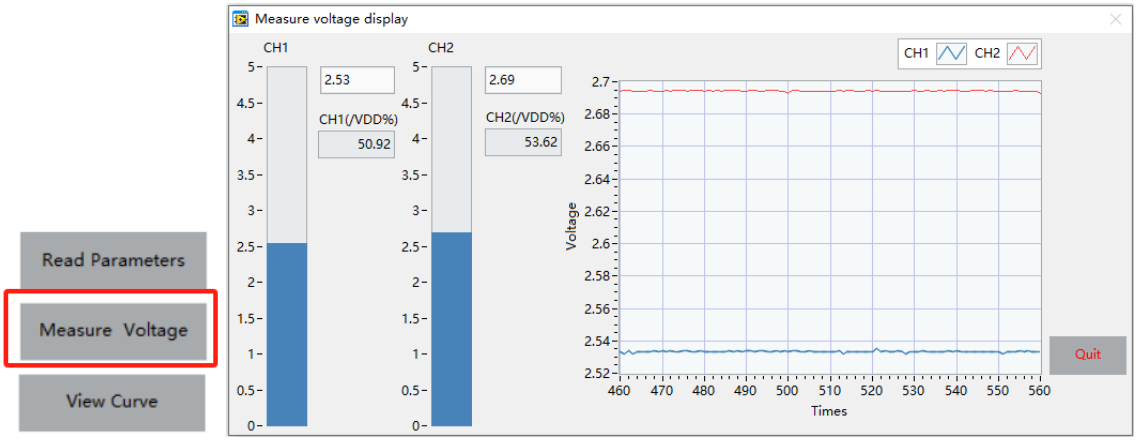


Figure 5.1.15 View the actual output voltage

14、 Repeat the above 5-13 steps to do programming tests on multiple chips, or do multiple manual programming tests on a single chip.

5.2 Analog output 2-point programming operation

The following example illustrates the programming operations for simulating the analog output of the MT6511GT chip's two-point parameters using the parameters below. For other cases, please refer to the operations in this example and the software instructions mentioned above.

Configuration parameters: CH1: Clamp_High=90%, Clamp_Low=7%, V1=7%, V2=90%, A1=40°, A2=126°, DP=10°; CH2: Clamp_High=93%, Clamp_Low=10%, V1=93%, V2=10%, A1=220°, A2=306°, DP=190°.

1、 Connect the programmer to the 12V power adapter and turn on the programmer power switch; the programmer's yellow light will stay on. Use a USB cable to connect the programmer to the computer, and the programmer's green light will remain on.

2、 Connect the adapter board to the programmer interface using an Ethernet cable. Confirm that the adapter board matches the chip model to be programmed. Ensure that the programmer port SITE1 is connected to chip CH1, and SITE2 is connected to chip CH2.

3、 Double-click the "PB600_MT6511GUI.exe" file to open the software and bring up the chip mode selection interface (Figure 5.2.1). Here, select "Dual Chip" and "Analog Output" parameters, then click "OK" to enter the programming interface for this mode (Figure 5.2.2).

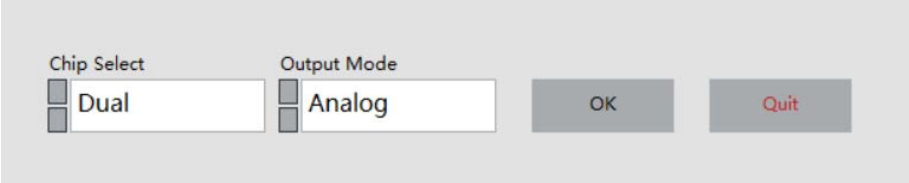


Figure 5.2.1 Chip Select

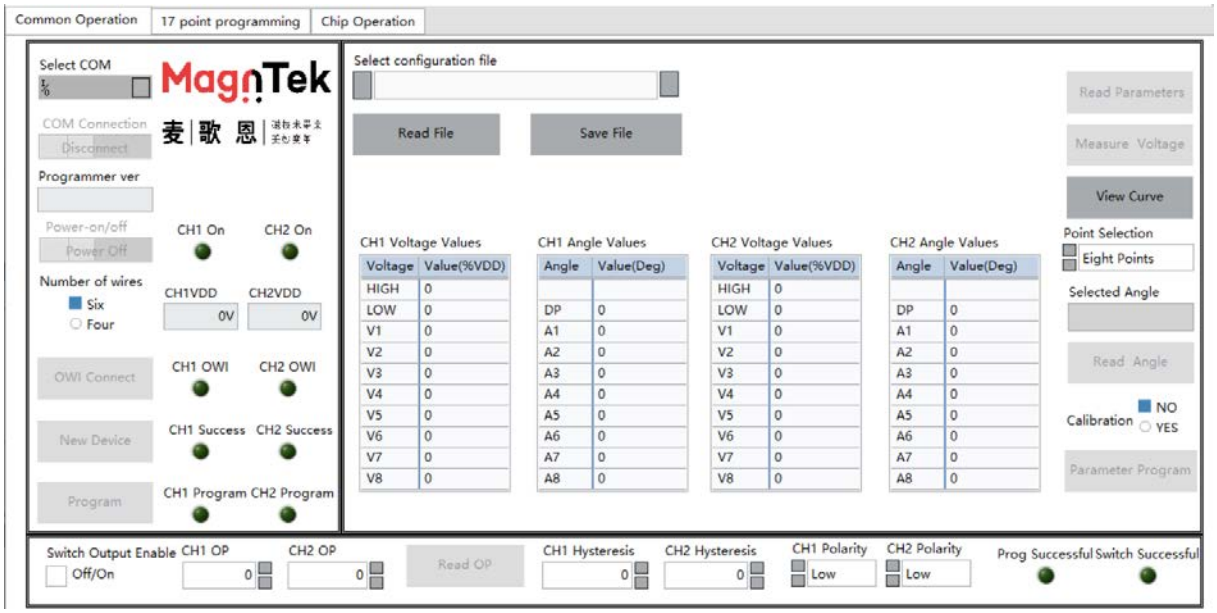


Figure 5.2.2 Programming main interface

4、 Click on the drop-down menu below "Select COM" to choose the corresponding port number for the programmer (Figure 5.2.3). Click on the "Disconnected" button below "COM connect" to establish communication between the programmer and the host computer (Figure 5.2.4). After successfully establishing communication between the programmer and the host computer, the programmer will return the current firmware version and display it in the box corresponding to "Programmer Version" below (Figure 5.2.5).

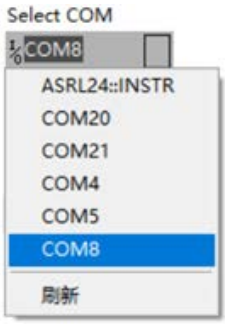


Figure 5.2.3 Select COM

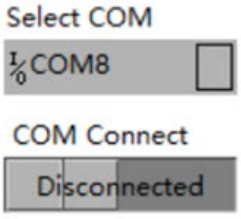


Figure 5.2.4 Click COM Connect normal connection

Figure 5.2.5 Status of the programmer after

5、 Click the button below "Power on" to power on the chip. When the power-on operation is successful, the power-on indicator light will stay green (Figure 5.2.6). If the power-on operation fails, a pop-up window will appear on the interface indicating a power-on exception (Figure 5.2.7). In this case, it is necessary to check the chip and hardware connections and then attempt the power-on operation again.

Figure 5.2.6 Indicator light steady on

5.2.7 Alarm after exception

6、 Click on the "Four" option under " Number of wires " to choose the chip connection mode (as described in detail in the hardware connection diagram in the third chapter). Click the "OWI Connect" button to establish communication between the programmer and the chip. When the connection is successful, the programmer connection indicator light will turn solid green (Figure 5.2.8).

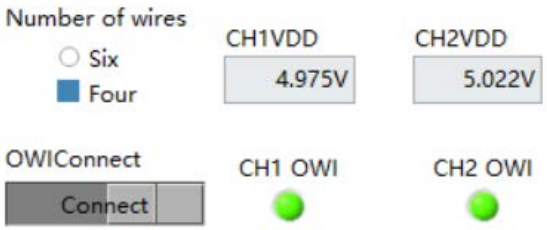


Figure 5.2.8 OWI Connect

7、 Click the "New Device" button to erase the existing angle programming data inside the chip. (If it's the first time programming the chip, you can skip this step to simplify the process and save programming time.) After the erasure is complete, the "Restore Complete" indicator light will turn solid green (Figure 5.2.9).

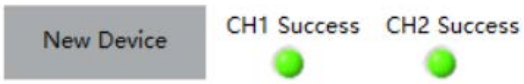


Figure 5.2.9 New Device

8、 Click the drop-down item under "Programming Points" and set it to "Two points".

9、 Fill in the above parameters into the corresponding parameter fields. 'HIGH', 'LOW', 'V1', 'V2', and 'DP' are fixed parameters that remain unchanged during repeated programming. 'A1' and 'A2' parameters are manually controlled and represent the current actual angle values of the chip (Figure 5.2.10).

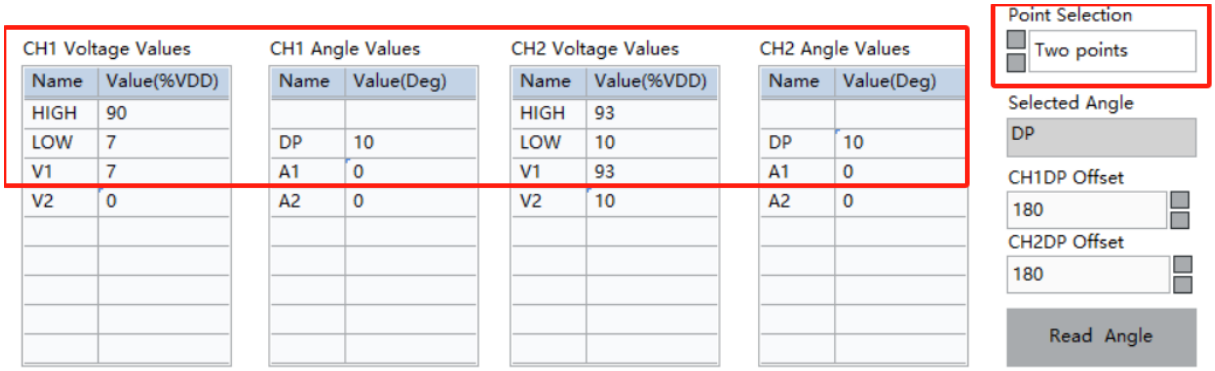


Figure 5.2.10 Select two point programming and fill in the fixed parameters

10、 Click on the "Value" box corresponding to 'A1' for CH1, place the magnet (sensor) angle at the first position to be programmed, and click the "Read Selected Angle" button after stabilization to read the current chip angle value. The current reading for CH1's 'A1' angle is 40°, and for CH2, it's 220°. Similarly, read the 'A2' angle values for CH1 and CH2 as 126° and 306°, respectively. Manually set the DP point to 10° (Figure 5.2.11).

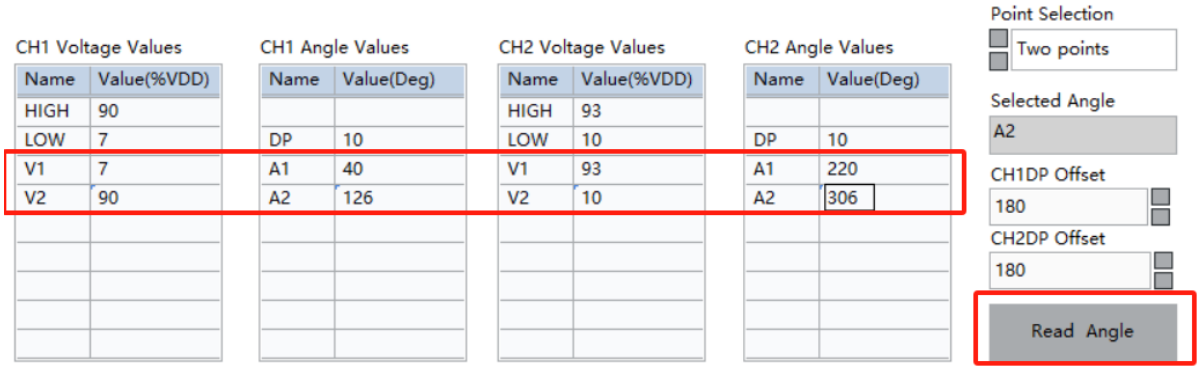
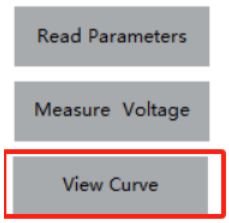


Figure 5.2.11 Read A1/A2 programming Angle values

11、 After completing the parameter configuration, click the 'View Curve' button to confirm whether the parameter settings meet expectations.



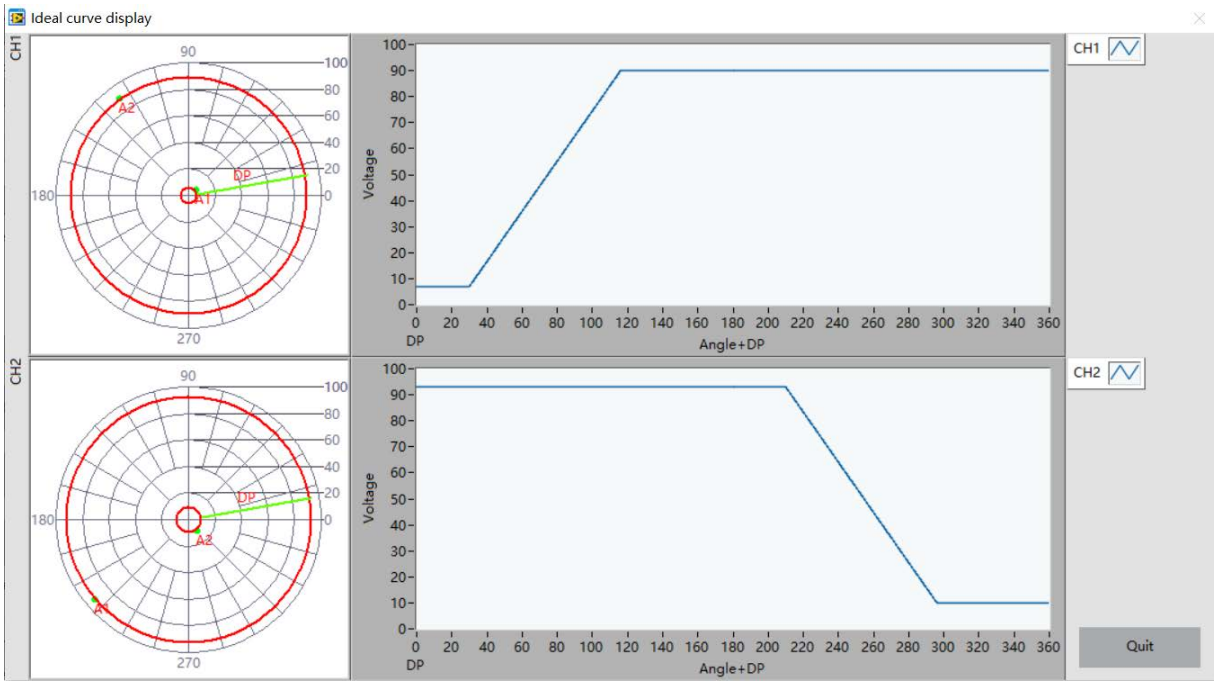


Figure 5.2.12 View Curve

12、 After confirming, click the 'Close' button to close the parameter effect window and return to the programming interface. Click the 'Write Parameter Programming' button to write the above-set parameters into the chip and solidify them. This process takes 3-6 seconds. If successful, the host computer will prompt 'Parameter programming successful,' and the 'Parameter programming success' indicator light below will light up. If it fails, an error message box will pop up indicating 'Parameter programming failed,' and you will need to reconfirm the connection before attempting programming again.

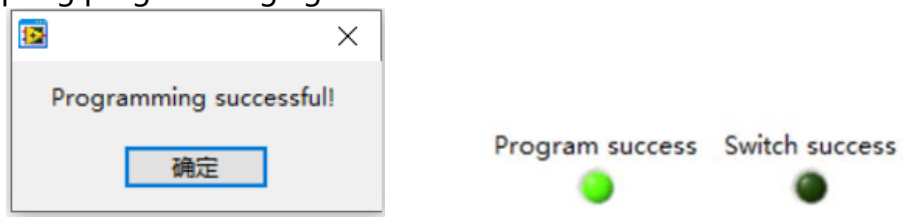


Figure 5.2.13 Programming successful

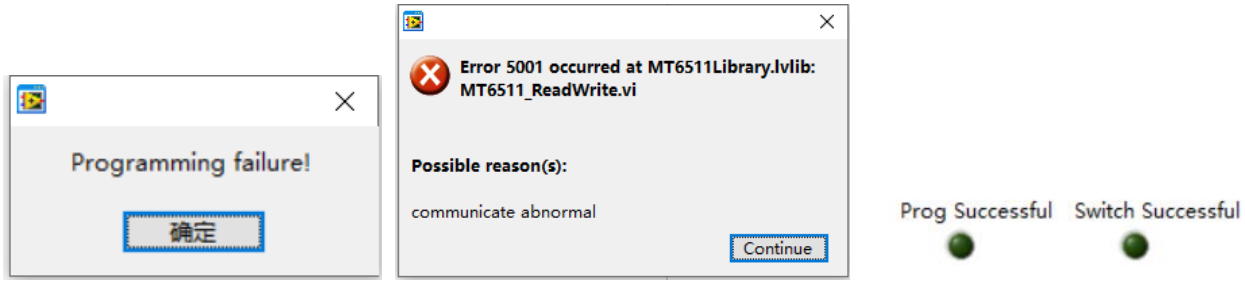


Figure 5.2.14 Programming failure

13、 After programming and burning is complete, click 'Measure Voltage' to observe if there are any errors in the chip's output. If everything is correct, you can click 'Stop and Exit' to close the interface. Then, click 'Chip Power Off' on the main interface to disconnect the wiring between the programmer and the chip before removing the chip for further testing or use.

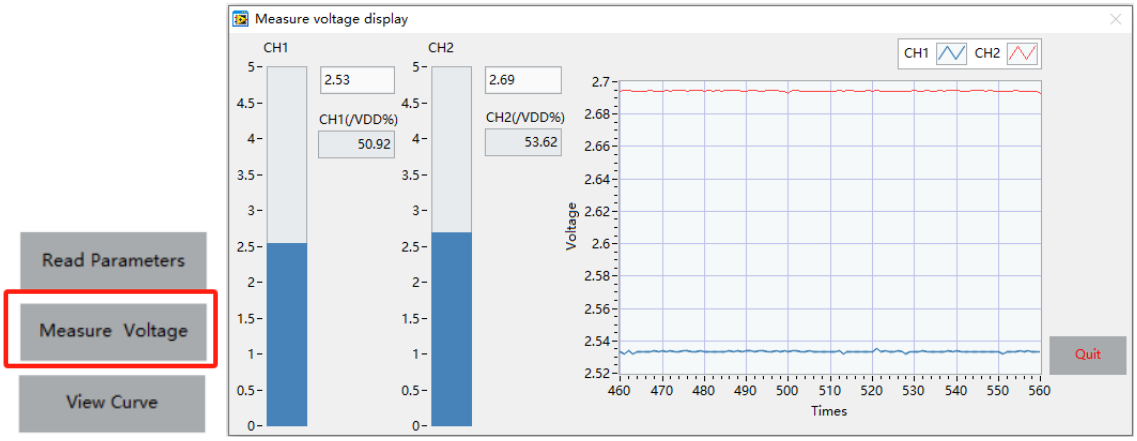


Figure 5.2.15 View the actual output voltage

14、 Repeat the above steps from 5 to 13 to conduct programming tests on multiple chips or perform multiple manual programming tests on a single chip.

5.3 Analog output eight plus switching signal programming operation

The following parameters are used as an example to introduce the programming operation of the software interface for the analog output of the MT6511GT chip with eight plus switching signal parameters. For other cases, refer to this routine operation and the above software description.

Configuration parameters：CH1：Clamp_High=95%、Clamp_Low=5%、V1=20%、V2=30%、V3=45%、V4=70%、V5=40%、V6=50%、V7=70%、V8=80%、DP=350°、Switch point delay 5°、The switching signal is low and valid；CH2：Clamp_High=90%、Clamp_Low=10%、V1=80%、V2=70%、V3=50%、V4=40%、V5=70%、V6=45%、V7=30%、V8=10%、DP=100°、Switch point delay 5°、The switching signal is low and valid.

1、 Connect the programmer to the 12V power adapter and turn on the programmer power switch; the programmer's yellow light will stay on. Use a USB cable to connect the programmer to the computer, and the programmer's green light will remain on.

2、 Connect the adapter board to the programmer interface using an Ethernet cable. Confirm that the adapter board matches the chip model to be programmed. Ensure that the programmer port SITE1 is connected to chip CH1, and SITE2 is connected to chip CH2.

3、 Double-click the "PB600_MT6511GUI.exe" file to open the software and bring up the chip mode selection interface (Figure 5.3.1). Here, select "Dual" and "Analog" parameters, then click "OK" to enter the programming interface for this mode (Figure 5.3.2).

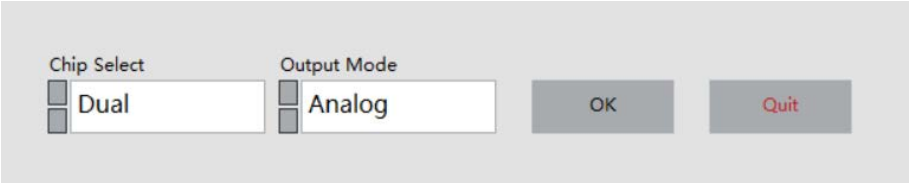


Figure 5.3.1 Chip Selection interface

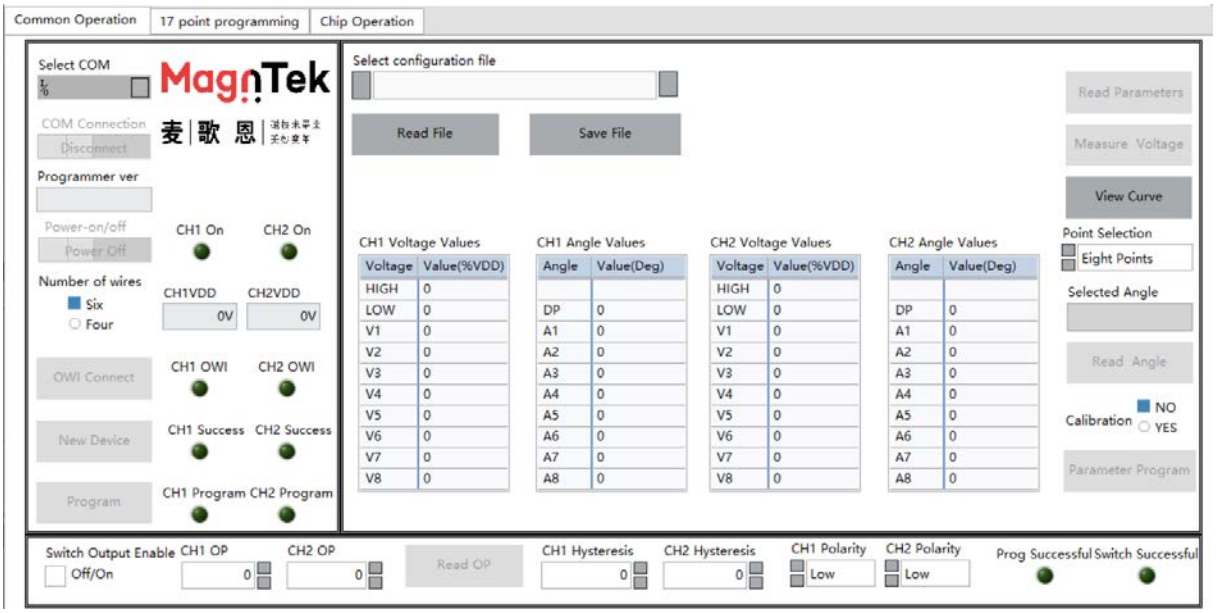


Figure 5.3.2 Programming main interface

4、 Click on the drop-down menu below "Select COM" to choose the corresponding port number for the programmer (Figure 5.3.3). Click on the "Disconnected" button below "COM connect" to establish communication between the programmer and the host computer (Figure 5.3.4). After successfully establishing communication between the programmer and the host computer, the programmer will return the current firmware version and display it in the box corresponding to "Programmer Version" below (Figure 5.3.5).

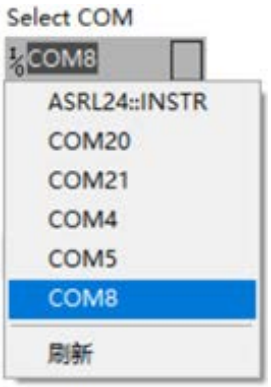


Figure 5.3.3 Select COM

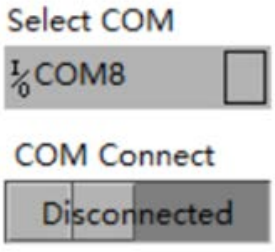


Figure 5.3.4 Click COM Connect normal connection

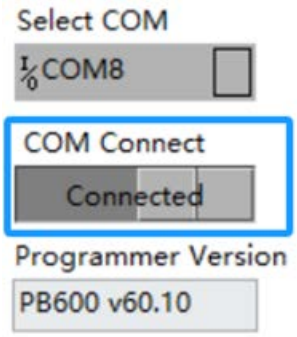


Figure 5.3.5 Status of the programmer after

5、 Click the button below "Power on" to power on the chip. When the power-on operation is successful, the power-on indicator light will stay green (Figure 5.3.6). If the power-on operation fails, a pop-up window will appear on the interface indicating a power-on exception (Figure 5.3.7). In this case, it is necessary to check the chip and hardware connections and then attempt the power-on operation again.

Figure 5.3.6 Indicator light steady on

5.3.7 Alarm after exception

6、 Click on the "Four" option under "Number of wires" to choose the chip connection mode (as described in detail in the hardware connection diagram in the third chapter). Click the "OWI Connect" button to establish communication between the programmer and the chip. When the connection is successful, the programmer connection indicator light will turn solid green (Figure 5.3.8).

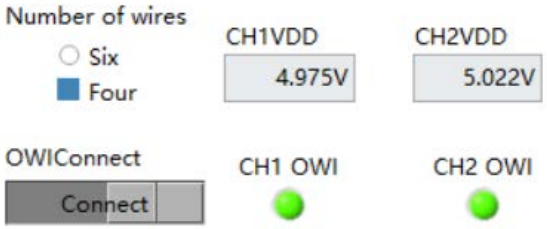


Figure 5.3.8 OWI Connect

7、 Click the "New Device" button to erase the existing angle programming data inside the chip. (If it's the first time programming the chip, you can skip this step to simplify the process and save programming time.) After the erasure is complete, the "Complete" indicator light will turn solid green (Figure 5.3.9).

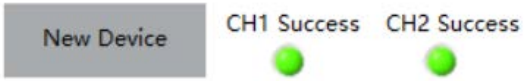


Figure 5.3.9 New Device

8、 Click the drop-down item under "Programming Points" and set it to "Eight points".

9、 Enter the above parameters in the corresponding parameter field. 'HIGH', 'LOW', 'V1' ~ 'V8', 'DP' and switch point hysteresis are fixed parameters, which remain unchanged during repeated programming after filling in. The "A1" ~ "A8" and "switch point threshold" parameters are manually controlled and are the current actual angle values of the chip (Figure 5.3.10).

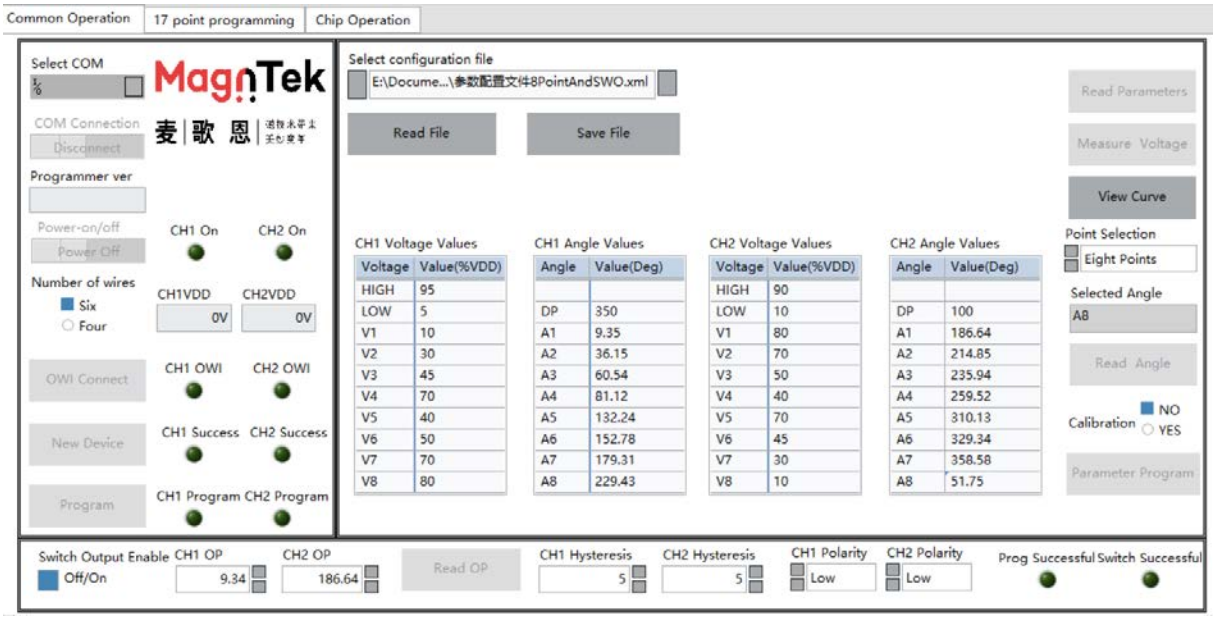


Figure 5.3.10 Select eight point programming and fill in the fixed parameters

10、 Click the "Angle value" box corresponding to "A1" of CH1, set the magnet (sensor) angle to the first position that needs to be programmed, click the "Selected Angle " button to read the current chip angle value after stabilization, and display it in the angle value A1 of CH1 and CH2. The A1 angle of the current readout chip angle CH1 is 9.35°. The angle A1 of CH2 is 186.64°. The angle values of 'A2' ~ 'A8' of CH1 and CH2 can be read in the same way (Figure 5.3.11).

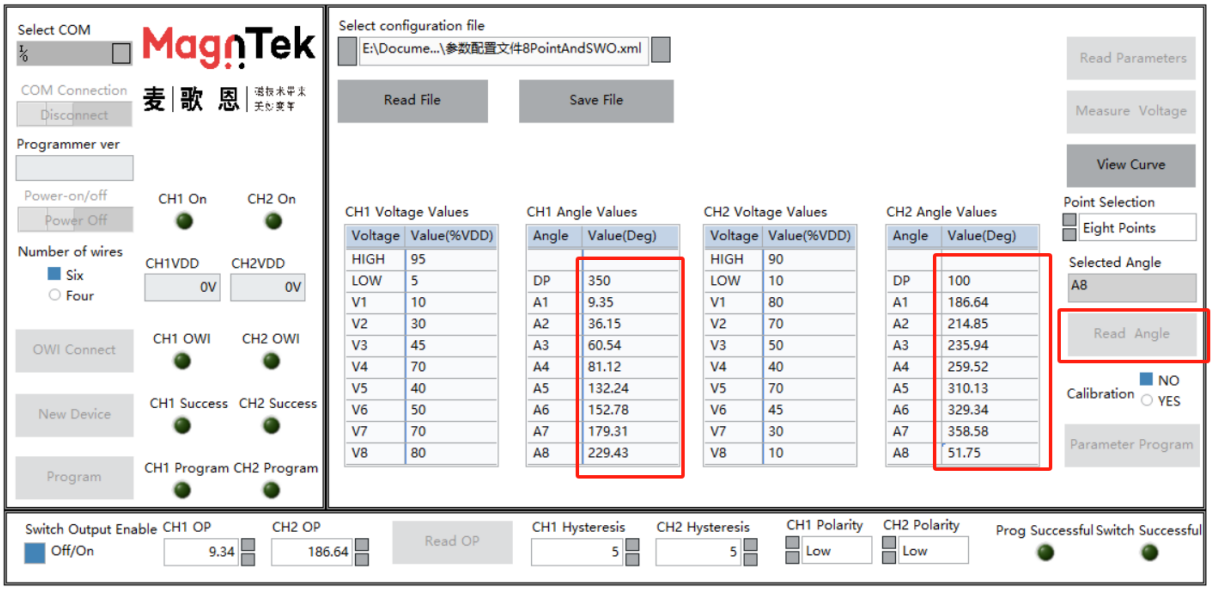


Figure 5.3.11 Read the Angle value of each position and the threshold of the switch point

11、 After completing the parameter configuration, click the "View Curve" button to confirm whether the parameter settings meet the expectations.

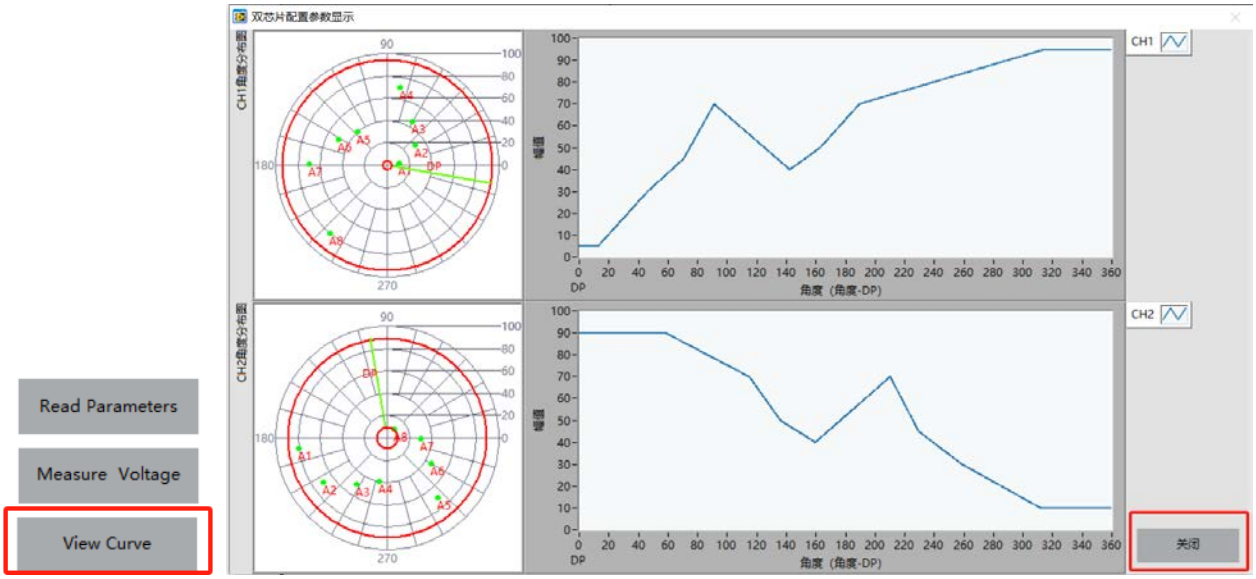


Figure 5.3.12 View Curve

12、 After confirming, click the "Exit" button to close the parameter effect window and return to the programming interface. Click the "Parameter program" button to write the above-set parameters into the chip and solidify them. This process takes 3-6 seconds. If successful, the host computer will prompt "Programming successful," and the "Program success" indicator light below will light up. If it fails, an error message box will pop up indicating "Parameter programming failed," and you will need to reconfirm the connection before attempting programming again.

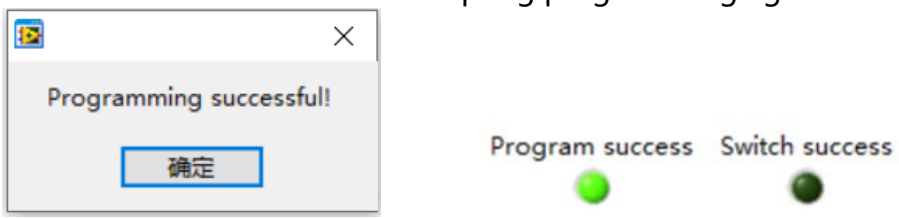


Figure 5.3.13 Programming successful

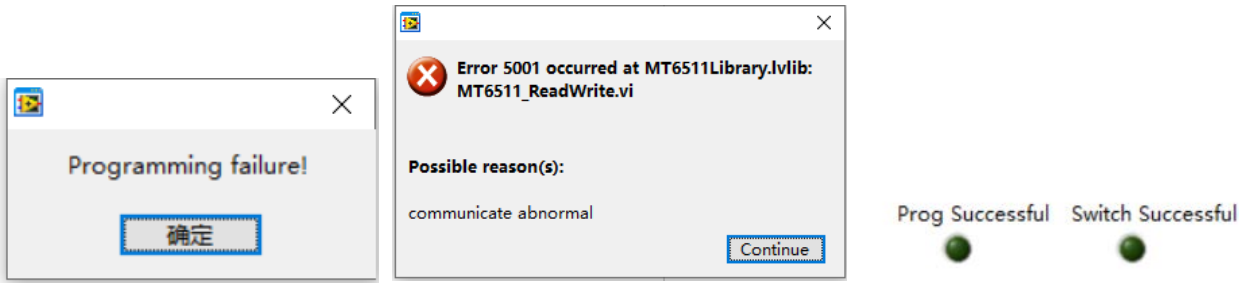


Figure 5.3.14 Programming failure

13、 After the programming and burning process is complete, click "Measure Voltage" to observe if there are any errors in the chip's output. If everything is correct, you can click "Quit" to close the interface. Then, click "Power off" on the main interface to disconnect the wiring between the programmer and the chip before removing the

chip for further testing or use.

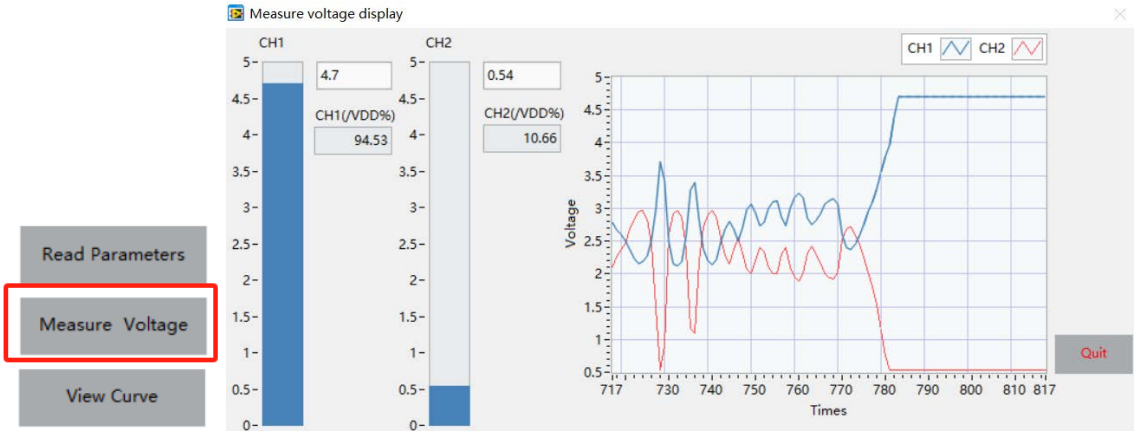


Figure 5.3.15 View the actual output voltage

14、 Repeat the operations from steps 5 to 13 to conduct programming tests on multiple chips or perform multiple manual programming tests on a single chip.

5.4 Analog output 17-point programming operation

The following parameters are used as an example to introduce the programming operation of the software interface for the analog output of the 17-point parameters of the MT6521CT, and the rest are referred to this routine operation and the above software description. The 17-point programming operation is relatively complicated, and the software is only recommended for the early research and development test stage, not for production. The production equipment can use the Excel formula file and library file provided by our company to develop automated calculation programming software.

Configuration parameters：CH1：Clamp_High=90%、Clamp_Low=10%、V1=10%、V2=90%、A1=54.94°、A2=139.94°、DP=10°。

1、 Connect the programmer to a 12V power and turn on the programmer's power switch. The programmer's yellow light remains on; Connect the computer and programmer using USB, and the programmer's green light remains on.

2、 Connect the adapter board to the programmer interface using a network cable, confirm that the adapter board matches the chip model that needs to be programmed, confirm that the programmer port SITE1 is connected to chip CH1, and SITE2 is connected to chip CH2.

3、 Refer to steps 3 to 13 of the two-point programming operation content in Section 5.2 of this chapter, and first use the above fixed parameters to do the two-point programming operation on the chip and burn it. Note that 17-point programming has a programming angle range limit, and the angle starting value and angle span value when doing two-point programming should be consistent with the 17-point programming.

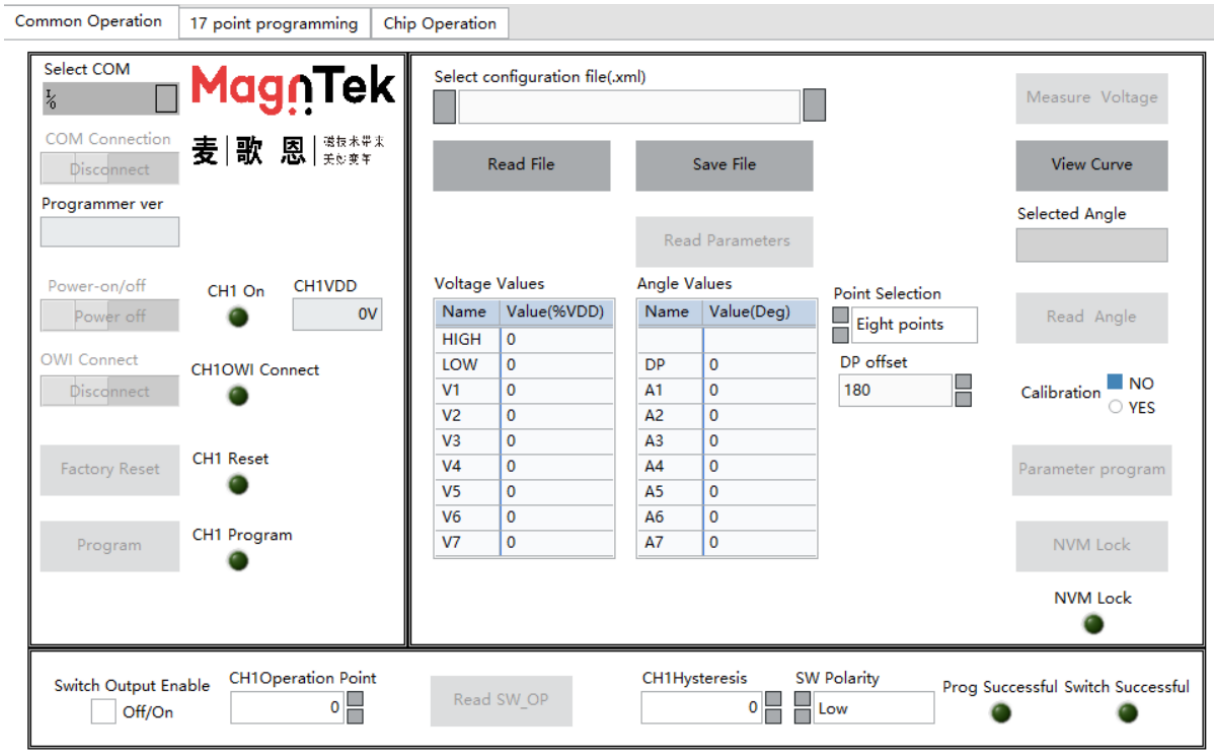


Figure 5.4.1 Two point programming and fill in the fixed parameters

4、 The use of high-precision acquisition equipment to the sensor (chip), uniformly move from the programming starting angle to the positions of 17 points each according to the programming angle range, and collect real-time analog output voltage signal values of the chip at various positions and convert them into voltage percentage ratios for saving (real_vdd%). At present, this part of the work needs to be operated by the user, and the interface does not have the operation function of collecting and recording data. The actual output accuracy of the chip DAC is 12 Bit, collecting analog signals requires the use of tools such as ADC or acquisition cards with an accuracy of 14 bits or higher.

5、 Calculate the theoretical calibration value (ideal_vdd%) of each position at 17 points through the Excel calculation file provided by our company, which can be calculated by various tools such as Excel/MATLAB/C computer software. At present, our company only provides Excel calculation formula documents. The error can be calculated using the formula error_vdd% = real_vdd% -ideal_vdd %. Figure 5.4.2 below shows the error value of 17 points before programming calculated by the current data.

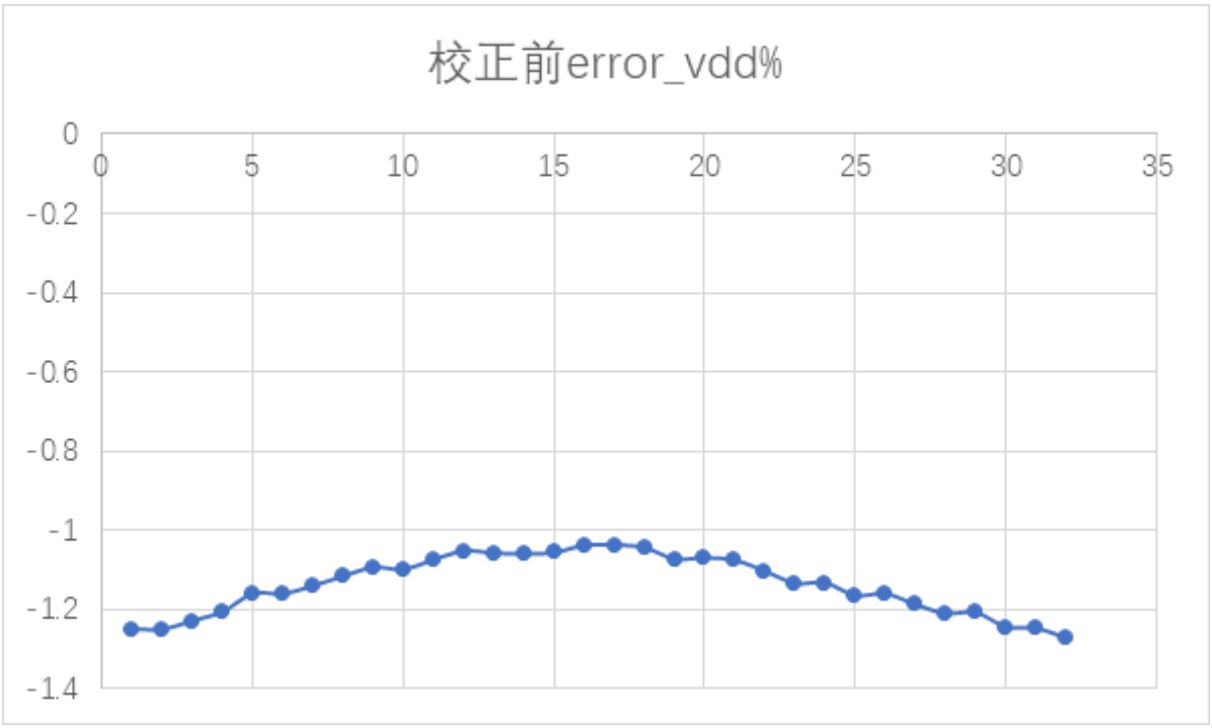


Figure 5.4.2 Error values of the actual output of 17 positions after 2 point programming

6、 Calculate the voltage input value after 17-point programming calibration according to the formula provided by the Excel document.

vdd% = ideal_vdd% – error_vdd%

7、 Enter the 17-point programming interface, fill in the "CH1 Start Angle", "CH1DP", "Slope", "Angle Span" High/Low clamp and "Rotation direction" as shown in Figure 5.4.3. After filling in the parameters completely, click the "Generate Angle" button on the right. At this time, the software will calculate the Angle value used in programming according to the above parameters and fill in the "Angle" position in the middle table.

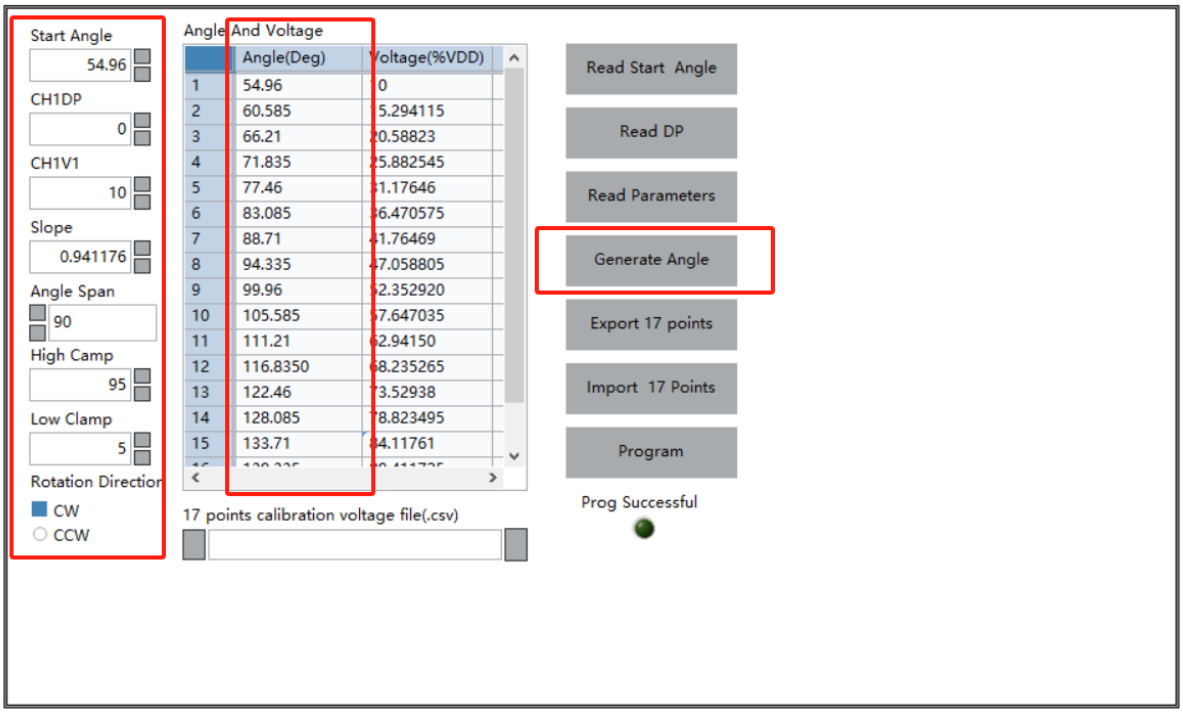


Figure 5.4.3 Fill in the fixed parameters and generate the angle voltage table

8、 Write the calibrated voltage value (vdd%) calculated in Step 5 into the calibrated Voltage Value column in the table on the interface. If you use Excel to calculate the calibrated value, you can select the file in the "17 points calibration voltage file" below, and click the "Import 17 points" button to import the calibrated voltage value.

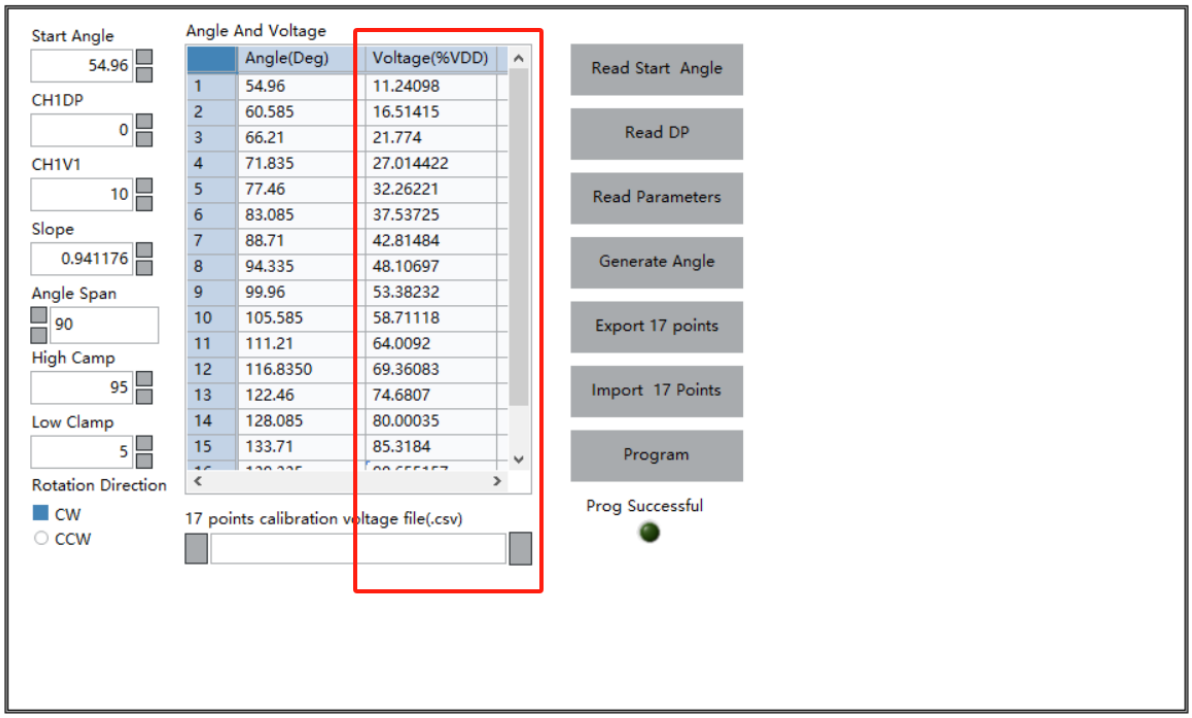


Figure 5.4.4 Fill in or import the calibrated voltage value

9、 Click the "Program" button, write the calibrated 17-point voltage value into the chip

register , this process will take 3-6s time, after the programming is completed, an pop-up will appear "Programming successful", and "Program success" indicator light below will light up.

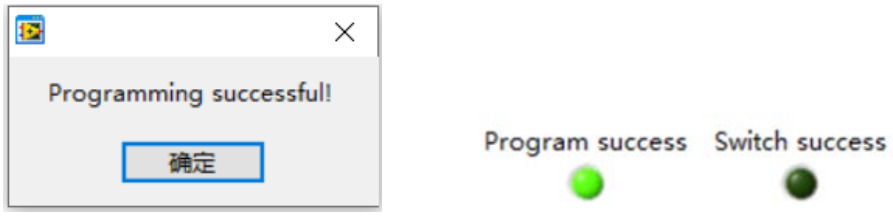


Figure 5.4.5 Programing successful

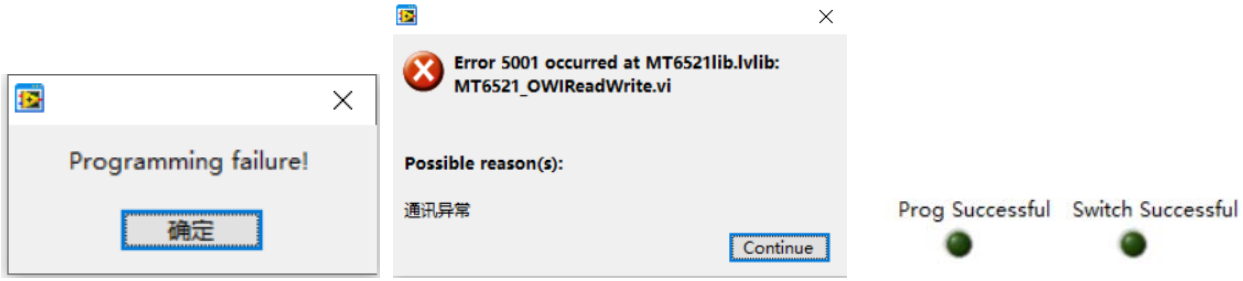


Figure 5.4.6 Programming failure

10、 After the programming, the data output voltage of the chip is collected again, and the actual error value after the final programming is completed is calculated.

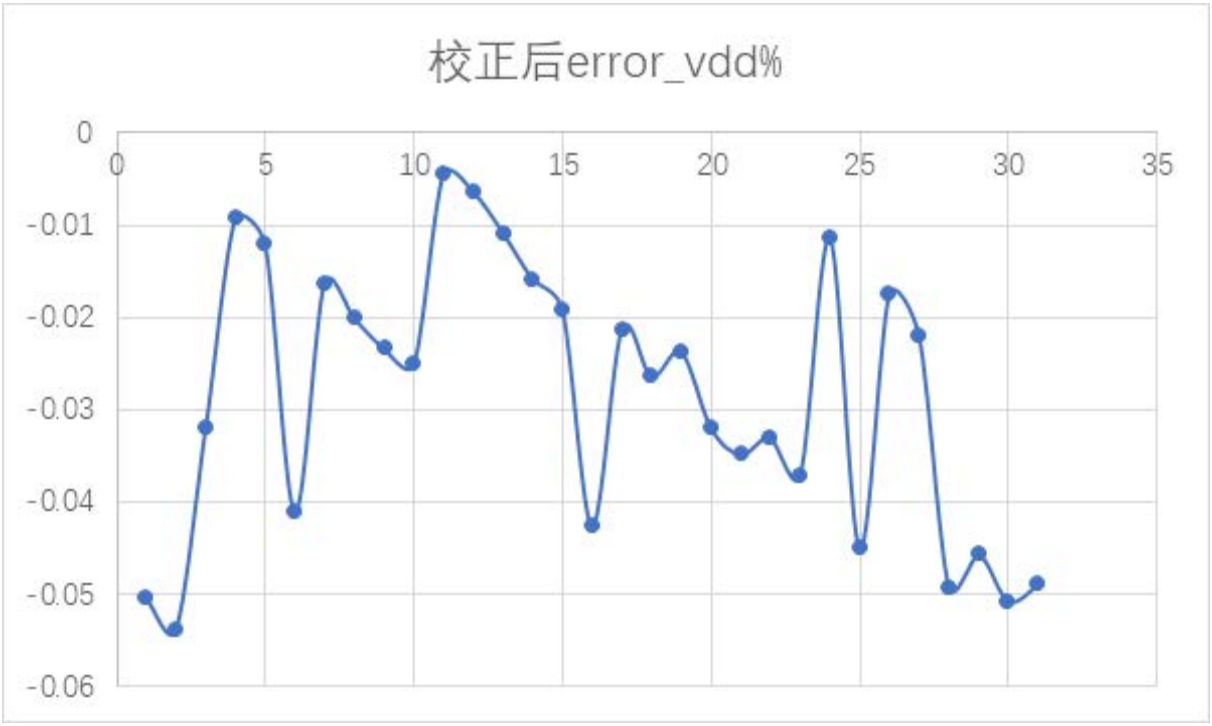


Figure 5.4.7 Actual error value

11、 Repeat steps 3-9 above to perform programming tests on multiple chips, or perform

multiple manual programming tests on a single chip.

5.5 PWM Output Programming Operation

The following is an example of using the following parameters to introduce the programming operation of PWM output for MT6521GT chip two-point parameters in this software interface. For other situations, please refer to this operation note and the above software description.

Configuration parameters: CH1: High level valid, PWM frequency 125Hz, push-pull output, Clamp_ High=90%, Clamp_ Low=10%, DP=10°; CH2: High level valid, PWM frequency 125Hz, push-pull output, Clamp_ High=80%, Clamp_ Low=20%, DP=190°.

1、 Connect the programmer to a 12V power and turn on the programmer's power switch. The programmer's yellow light remains on; Connect the computer and programmer using USB, and the programmer's green light remains on.

2、 Connect the adapter board to the programmer interface using a network cable, confirm that the adapter board matches the chip model that needs to be programmed, confirm that the programmer port SITE1 is connected to chip CH1, and SITE2 is connected to chip CH2.

3、 Double click on the "PB600-MT6521GUI. exe" file, open the software, and a chip mode selection interface will pop up (Figure 5.5.1). After selecting the "Dual" and "PWM" parameters, click "OK" to enter the programming interface for this mode (Figure 5.5.2).

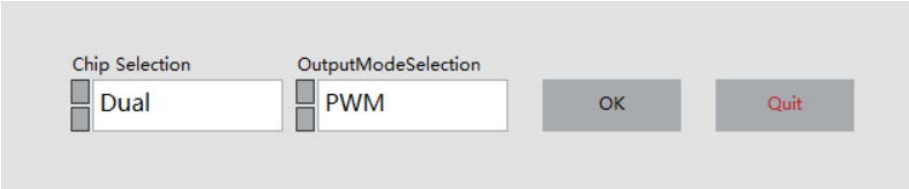


Figure 5.5.1 Chip mode selection

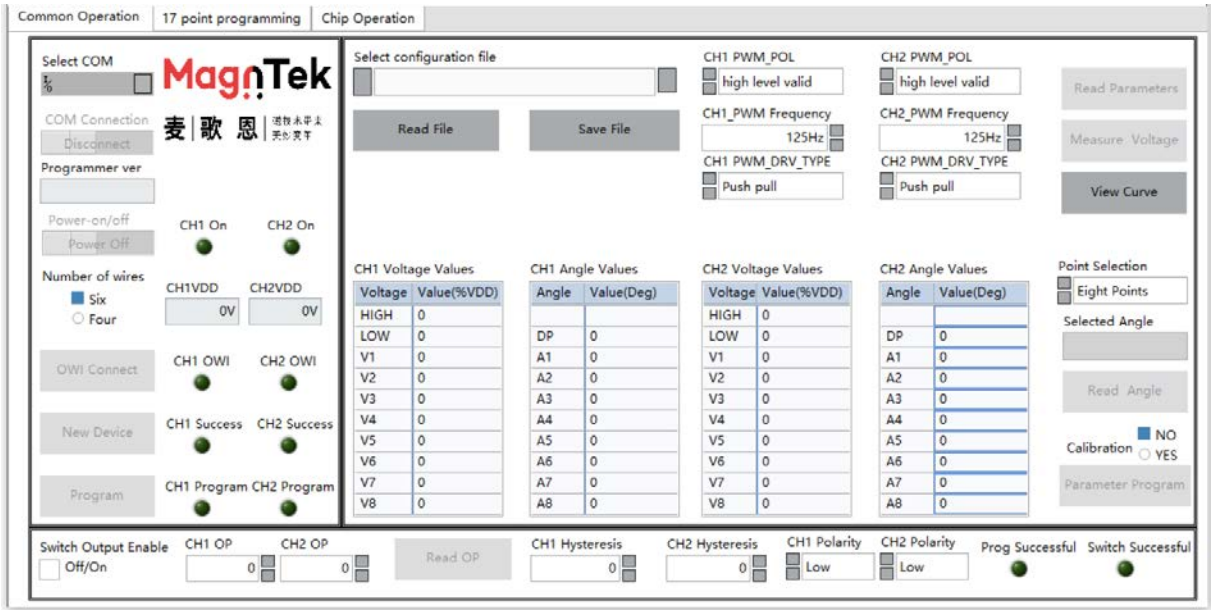


Figure 5.5.2 Dual chip PWM output programming

4、 Click the menu below "Select COM" to select the corresponding port number for the programmer (Figure 5.5.3). Click the "disconnected" button below the "COM Connect" to establish a communication connection between the programmer and the computer (Figure 5.5.4). After establishing communication between the programmer and the computer correctly, the programmer will return the current firmware version number and display it in the box corresponding to "Programmer Version" below (Figure 5.5.5).

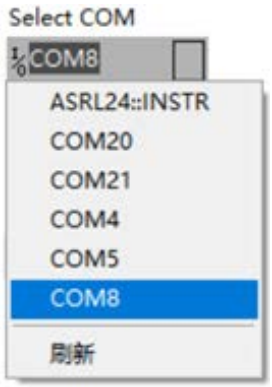


Figure 5.5.3 Select COM

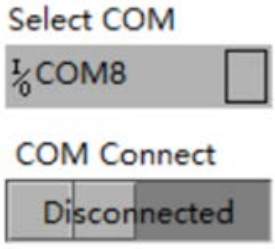


Figure 5.5.4 COM Connect

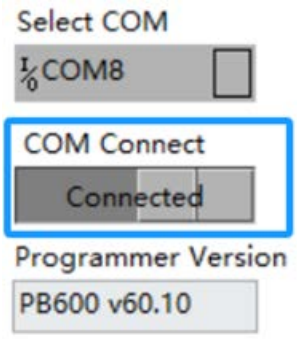


Figure 5.5.5 Connected state

5、 Click the button below "Power on/off chip" to power on the chip. When it is powered on successfully , the power on indicator light will remain green (Figure 5.5.6); When it is powered on abnormally, an error pop-up will appear , displaying powered on abnormally (Figure 5.5.7). At this time, it is necessary to check the chip and hardware connections before attempting the power on operation again.

Figure 5.5.6 Powered on successfully

5.5.7 Powered on abnormally

6、 Click on the "Four" option under "Number of wires" and select the chip connection form (as described in the programmer hardware connection diagram in Chapter 3). Click the "OWI Connect" button to establish a communication connection between the programmer and the chip. When connected normally, the programmer connection indicator light will turn green (Figure 5.5.8).

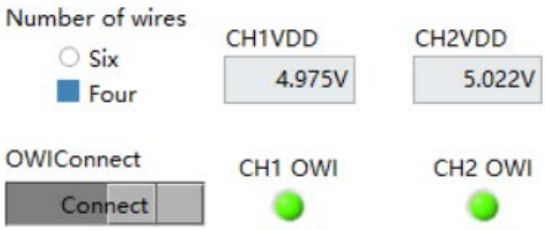


Figure 5.5.8 OWI link

7、 Click the "Factory Reset" button to erase the original angle programming data inside the chip. (If the chip is being programmed for the first time, this step can be skipped to simplify the operation) After erasing is completed, the "Reset" indicator light will turn green(Figure 5.5.9)

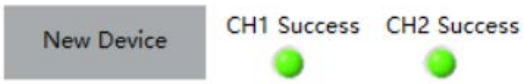


Figure 5.5.9 Restore factory settings

8、 Click on the menu under " Point Selection" and set it to "Two Points".

9、 Fill in the above parameters in the corresponding parameter column "HIGH", "LOW", "V1", "V2", "DP", "PWM_POL", "PWM Frequency", and "PWM_DRV_TYPE " are fixed parameters that remain unchanged during repeated programming. The 'A1 'and' A2 'parameters are manually controlled and represent the current actual angle value of the chip (Figure 5.5.10).

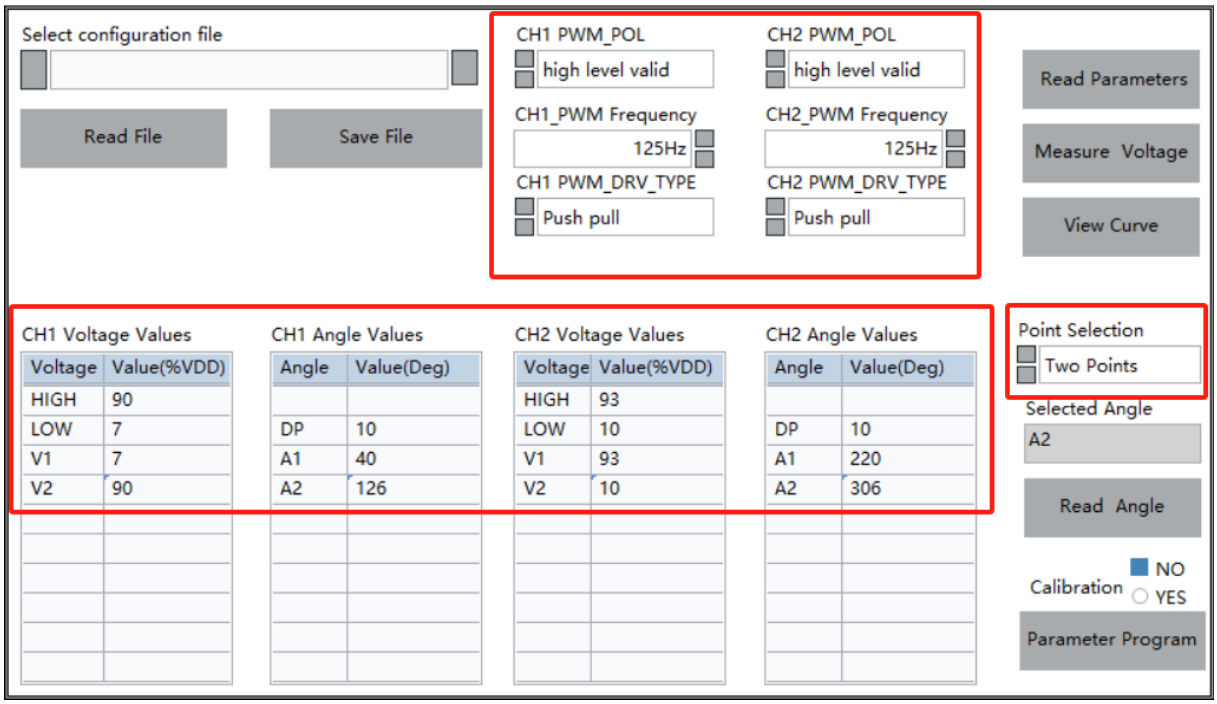


Figure 5.5.10 Two-point programming and fill in fixed parameters

10、 Click on the "Angle Value" box corresponding to "A1" in CH1, place the magnet (sensor) angle at the first position that needs to be programmed, stabilize it, and then click the "Read Angle" button to read the current chip angle value, which will be displayed in the angle values "A1" of CH1 and CH2. The current read chip angle is 81.83 ° for "A1" of CH1, and 263.68 ° for "A1" of CH2; The same way, the angle value of "A2" for CH1 is 173.56 °, and the angle value of "A2" for CH2 is 351.64 ° (Figure 5.5.11).

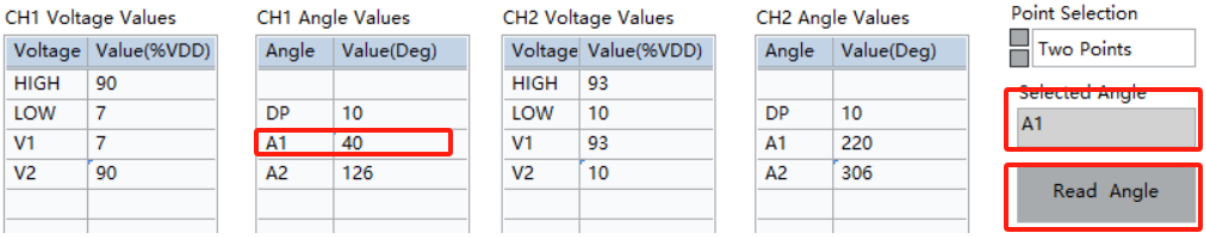


Figure 5.5.11 Read A1/A2 angle value

11、 After completing the parameter configuration, click the "View Curve" button to confirm whether the parameter settings meet expectations.

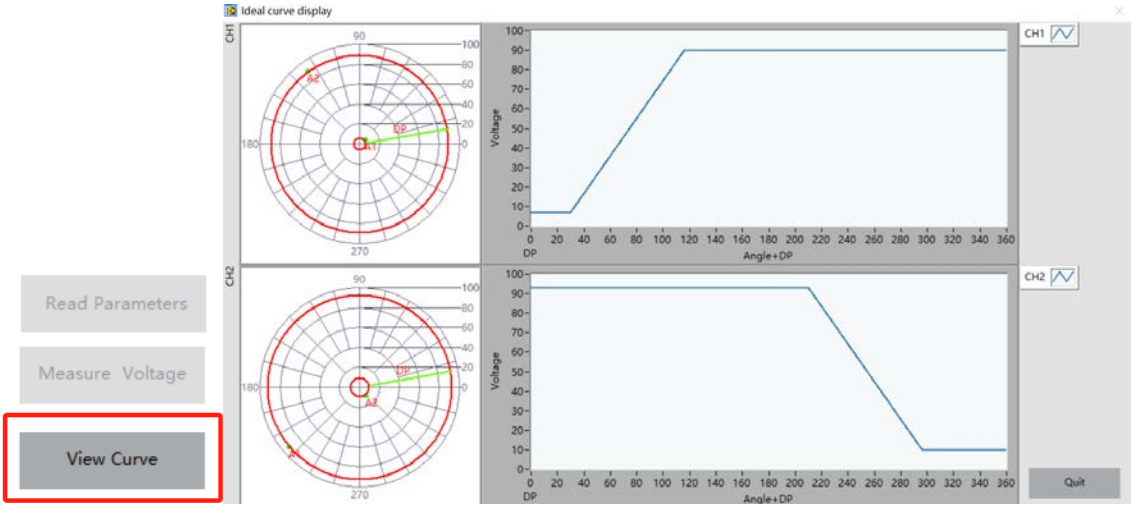


Figure 5.5.12 Programming rendering

12、 After confirmation, click the "Close" button to close the parameter rendering window and return to the programming interface. Click the "Parameter Program" button to write the above set parameters into the chip and solidify them. This process takes 3-6 seconds. If successful, the computer will prompt "Programming successful" and the " Program success" indicator light below will light up; If it fails, an error pop-up will appear "Programming failure", and it is necessary to confirm the connection again before programming.

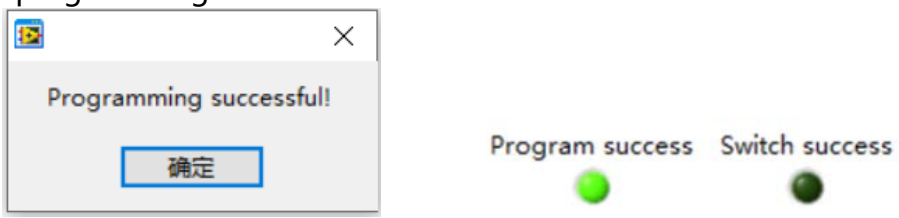


Figure 5.5.13 Programming successful

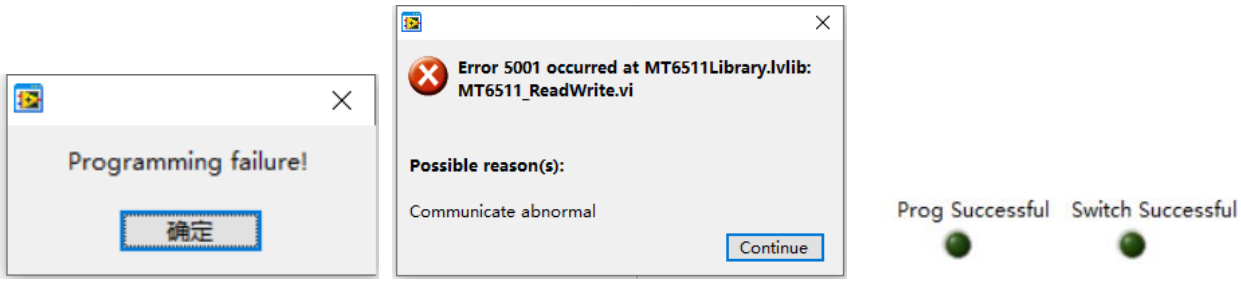


Figure 5.5.14 Programming failure

13、 After programming, click "power off", disconnect the wiring between the programmer and the chip, and then remove the chip for next testing or use.

14、 Repeat steps 5-13 above to perform programming tests on multiple chips, or perform multiple manual programming tests on a single chip.

5.6 SENT Output Programming Operation

The following is an example of using the following parameters to introduce the programming operation of SENT output for MT6521GT chip two-point parameters in this software interface. For other situations, please refer to this operation note and the above software description.

Configuration parameters：CH1：Clamp_High=3686、Clamp_Low=410、V1=410、V2=3686、A1=40°、A2=126°、DP=0°；CH2：Clamp_ High =3686、Clamp_ Low =410、V1=3686、V2=410、A1=220°、A2=306°、DP=190°。

1、 Connect the programmer to a 12V power and turn on the programmer's power switch. The programmer's yellow light remains on; Connect the computer and programmer using USB, and the programmer's green light remains on.

2、 Connect the adapter board to the programmer interface using a network cable, confirm that the adapter board matches the chip model that needs to be programmed, confirm that the programmer port SITE1 is connected to chip CH1, and SITE2 is connected to chip CH2.

3、 Double click on the "PB600-MT6521GUI. exe" file, open the software, and a chip mode selection interface will pop up (Figure 5.6.1). After selecting the "Dual" and "SENT" parameters, click "OK" to enter the programming interface for this mode (Figure 5.6.2).

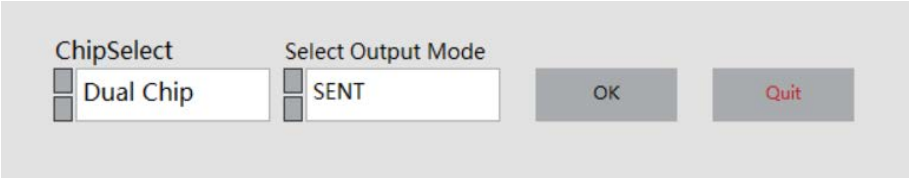


Figure 5.6.1 Chip mode selection

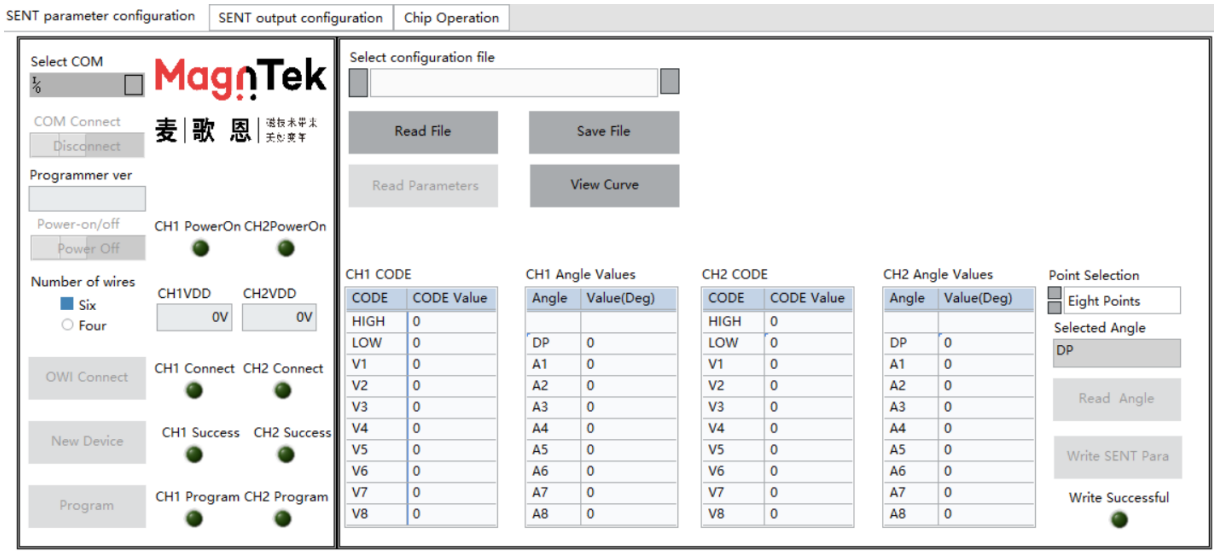


Figure 5.6.2 Dual chip SENT parameter configuration

4、 Click the menu below "Select COM" to select the corresponding port number for the programmer (Figure 5.6.3). Click the "disconnected" button below the "COM Connect" to establish a communication connection between the programmer and the computer (Figure 5.6.4). After establishing communication between the programmer and the computer correctly, the programmer will return the current firmware version number and display it in the box corresponding to "Programmer Version" below (Figure 5.6.5).

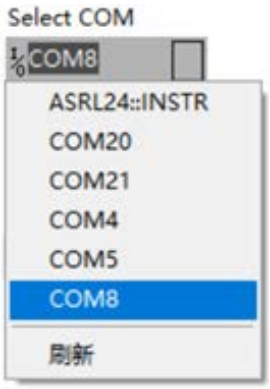


Figure 5.6.3 Select COM

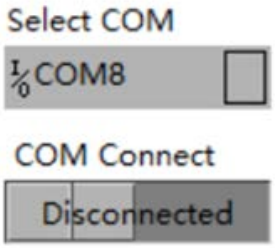


Figure 5.6.4 COM Connect

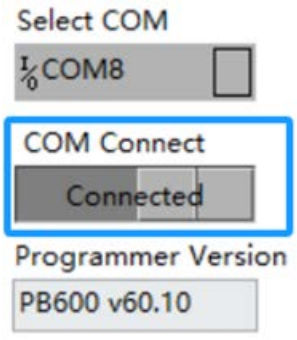


Figure 5.6.5 Connected state

5、 Click the button below "Power on/off chip" to power on the chip. When it is powered on successfully , the power on indicator light will remain green (Figure 5.6.6); When it is powered on abnormally, an error pop-up will appear , displaying powered on abnormally (Figure 5.6.7). At this time, it is necessary to check the chip and hardware connections before attempting the power on operation again

Figure 5.6.6 Powered on successfully

5.6.7 Powered on abnormally

6、 Click the "Four" option under "Number of wires" and select the chip connection form (described in the programmer hardware connection diagram in Chapter 3). Click the " Connect" button to establish a communication connection between the programmer and the chip. When connected normally, the programmer connection indicator light will turn green (Figure 5.6.8).

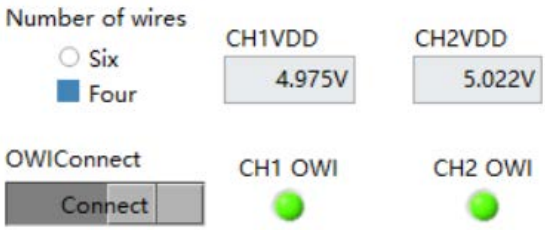


Figure 5.6.8 OWI connection

7、 Click the "Restore Factory Settings" button to erase the original angle programming data. (If the chip is being programmed for the first time, this step can be skipped) After erasing is completed, the "Factory Reset" indicator light will turn green (Figure 5.6.9)

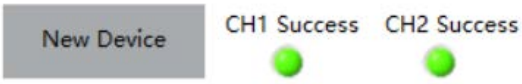


Figure 5.6.9 Restore factory settings

8、 Fill in the above parameters in the corresponding parameter column ‘ "HIGH", "LOW", "V1", "V2", and "DP" are fixed parameters that remain unchanged during repeated programming. (Note: The 'HIGH', 'LOW', 'V1'~'V8' parameters on this interface are decimal CODE values, with a range of [0: 4095]) The 'A1' and 'A2' parameters are manually controlled and represent the current actual angle value of the chip (Figure 5.6.10).

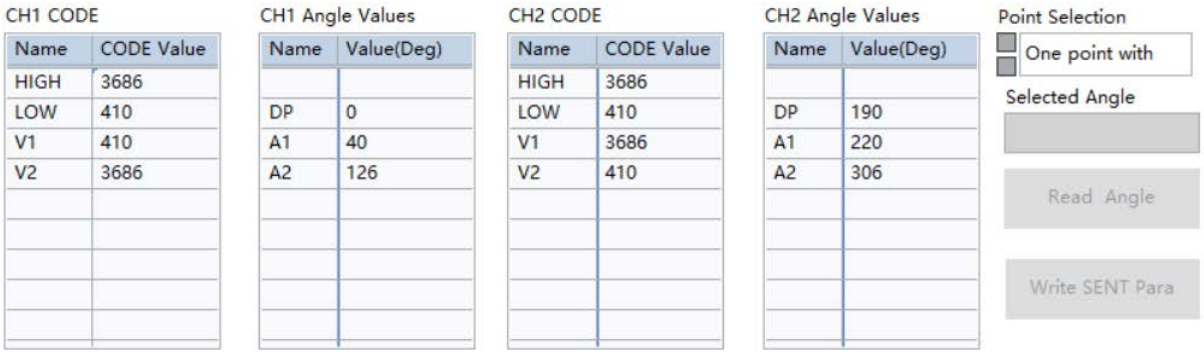


Figure 5.6.10 Two-point programming and fill in fixed parameters

9、 Click on the "Angle Value" box corresponding to "A1" in CH1, place the magnet (sensor) angle at the first position that needs to be programmed, stabilize it, and then click the "Read Angle" button to read the current chip angle value, which will be displayed in the angle values "A1" of CH1 and CH2. The current read chip angle is 40 ° for "A1" of CH1, and 220 ° for "A1" of CH2; The same way, the angle value of "A2" for CH1 is 126 °, and the angle value of "A2" for CH2 is 306 ° (Figure 5.6.11).

Figure 5.6.11 Read A1/A2 angle value

10、 After completing the parameter configuration, click the "View Curve" button to confirm whether the parameter settings meet expectations.

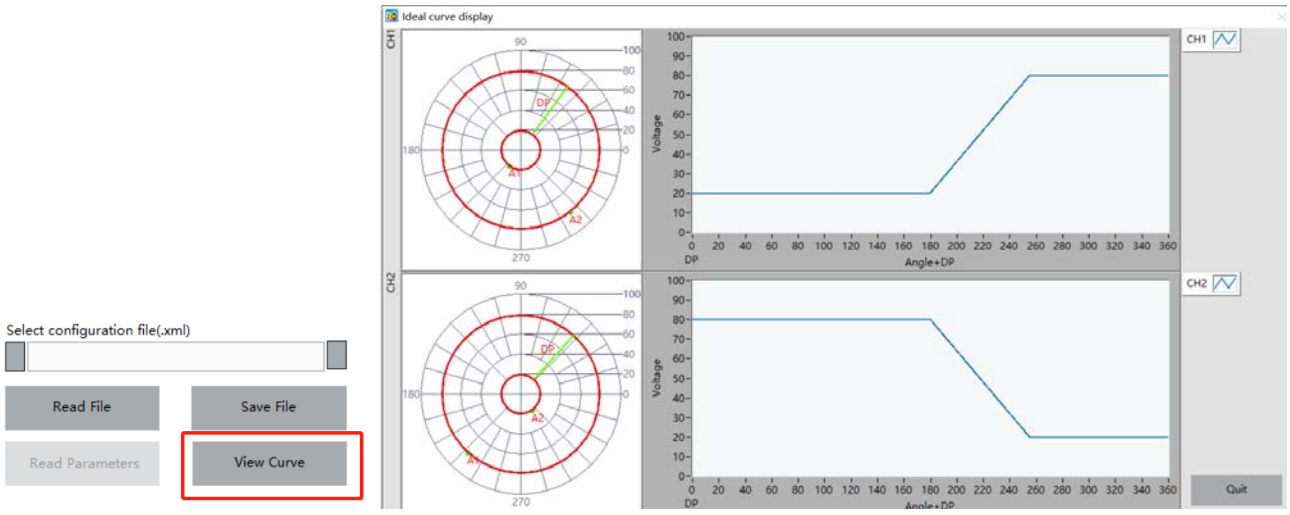


Figure 5.6.12 Programming rendering

11、 After confirmation, click the "Close" button to close the parameter rendering window and return to the programming interface. Click the "Write SENT Para" button to write the above set parameters into the chip and solidify them. This process will take 3-6 seconds. If successful, the computer will prompt "Parameter programming successful" and the "Write successful" indicator light below will light up; If it fails, an error pop-up will appear "Failed to write parameters", and it is necessary to confirm the connection again before programming.

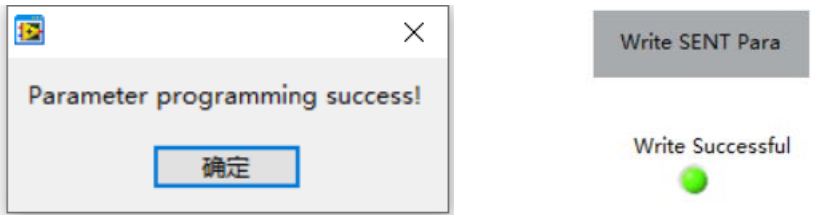


Figure 5.6.13 Program successful

Figure 5.6.14 Program fail

12、 Click on the "SENT output configuration" interface to the parameter configuration. Please refer to the product specification or document "MT6521_User SENT Protocol and Registers Manual " for the parameter information. Attention: All input that can be freely filled in here need to be filled with three hexadecimal digits (such as' 05D '). High bits less than three digits need to be manually filled with zeros, otherwise there may be programming errors.

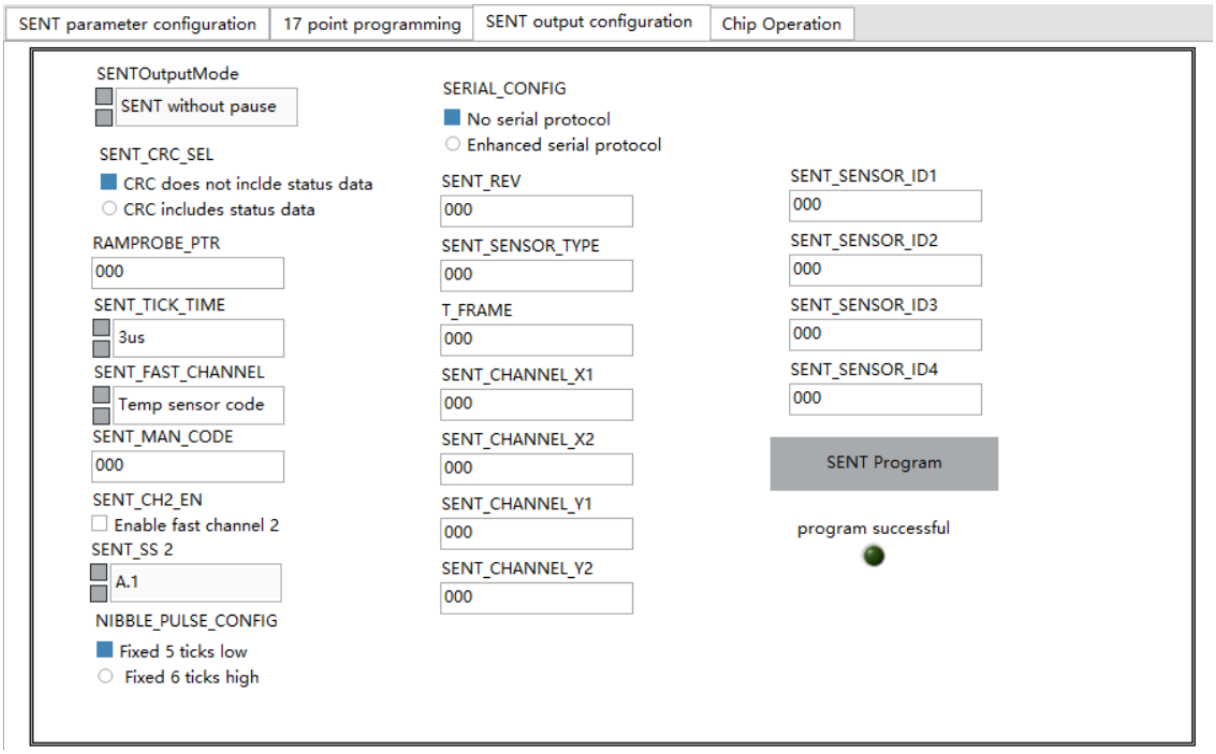


Figure 5.6.15 SENT output configuration

13、 After configuring the parameters, click the "SENT Program" button to write the interface SENT parameter configuration into the chip and solidify it. This process takes 3-6 seconds. If successful, the "program successful" indicator light below will light up; If it fails, an error pop-up will appear, and you need to reconfirm the connection before programming again.

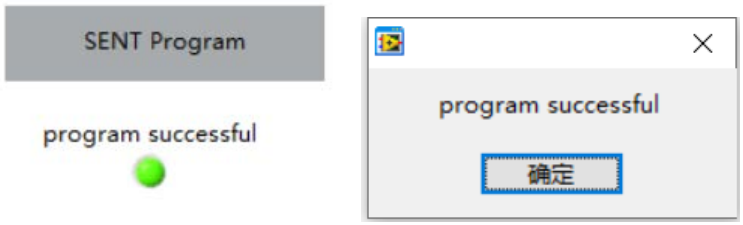


Figure 5.6.13 Program successful

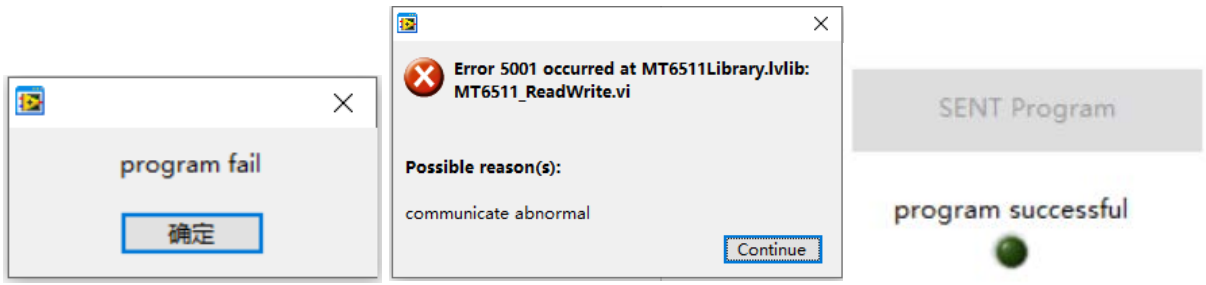


Figure 5.6.14 Program fail

14、 After programming, click "power off", disconnect the wiring between the programmer and the chip, and then remove the chip for next testing or use.

15、 Repeat steps 5-14 above to perform programming tests on multiple chips, or perform multiple manual programming tests on a single chip.

6 Note

- If the programmer is not used for a long time, please turn off the power switch and disconnect the USB interface from the computer to ensure use safety.
- The software and hardware of the programmer need to be matched, otherwise when connecting to the programmer's serial port, errors or no response will be reported, resulting in abnormal use.
- The chip to be programmed must be consistent with the programming interface model, otherwise it is easy to damage the chip
- When the chip is replaced, please ensure that the programming interface power is turned off to ensure that the chip will not be damaged due to hot swapping. This state can be changed on the software interface at any time.
- In the programming process of automated programming equipment, please ensure that each chip strictly follows the sequence "chip connection to programmer" → " power on" → "parameter programming" → "power off".
- It is strictly prohibited to directly switch to different chips for programming when the interface displays "power on", otherwise it will affect chip performance and even damage the chip
- The programmer is powered by an external power adapter, with a maximum supply voltage：48V DC. It is strictly prohibited to use a power adapter that exceeds the maximum supply voltage, otherwise it will cause irreparable damage to the programmer.
- The recommended minimum output power of the power adapter is 12W (12V1A). It is strictly prohibited to use a lower power power adapter, otherwise the programmer will not work properly
- It is recommended to use a wiring harness with an internal shielding layer and an independent grounding wire for USB and network cables. Otherwise, external environmental interference will affect the programming process to varying degrees, and may even affect the programming results of the final product, leading to poor programming.
- It is strongly recommended to use our USB cables and network cables for automated programming equipment, and it is recommended to route the cables as far as possible away from interference sources with high voltage (24V or above) or high current such as equipment power adapters, computer power lines, stepper/servo motor power lines, and drag line boards. At the same time, the grounding screw of the programmer casing

needs to be grounded to improve the system's anti-interference ability during the programming process.

- If the automation equipment is a programming/testing integrated device and needs to connect the OUT pin wiring of the relay switching chip in series, it is strongly recommended to connect the wiring between the chip and the programmer to the normally closed path of the corresponding relay (relay is in no current state) to reduce interference factors during chip programming and improve the yield of chip programming.
- The PB600 programmer housing (metal shell) has an independent grounding screw column at the top. When there are many interference factors in the programmer's usage environment (multiple large devices working in the same room), it is recommended to connect the programmer grounding column to the ground of the programmer's usage environment.

7 Version History

Version	Content	Date
2.0	Initial version release	2023/10