GUI Application Note

Single-phase Motor Control MCU

EU5821

Fortior Technology Co., Ltd

Table of Contents

1 System overview

1.1 Features

The EU5821 is integrated with motor engine (ME) IC and 8051 single-phase BLDC chip core. The ME is integrated with Smart Engine modules and can execute high-speed mechanical engineering calculation independently. The 8051 core can be used to configure parameters and proceed daily operations. The two cores work parallelly to achieve various high performance motor controls. Most of the command rate of the 8051 is 1T or 2T. It is internally integrated with high-speed comparator, pre-driver, ADC, CRC, I2C, UART, multiple Timer, PWM and other functions. It has built-in high voltage LDO and Hall sensor that can be applied in square-wave BLDC motor.

1.2 Application

It can be applied to single-phase BLDC motor with hall sensor.

2 Description

2.1 EU5821T Demo Board Circuit Layout

The demo board incorporates EU5821T and is designed with power reverse connection protection circuit, current detection circuit, hall circuit, MOSFET driver circuit, back electromotive force (BEMF) detection circuit and peripheral interface and only supports sensor driver.

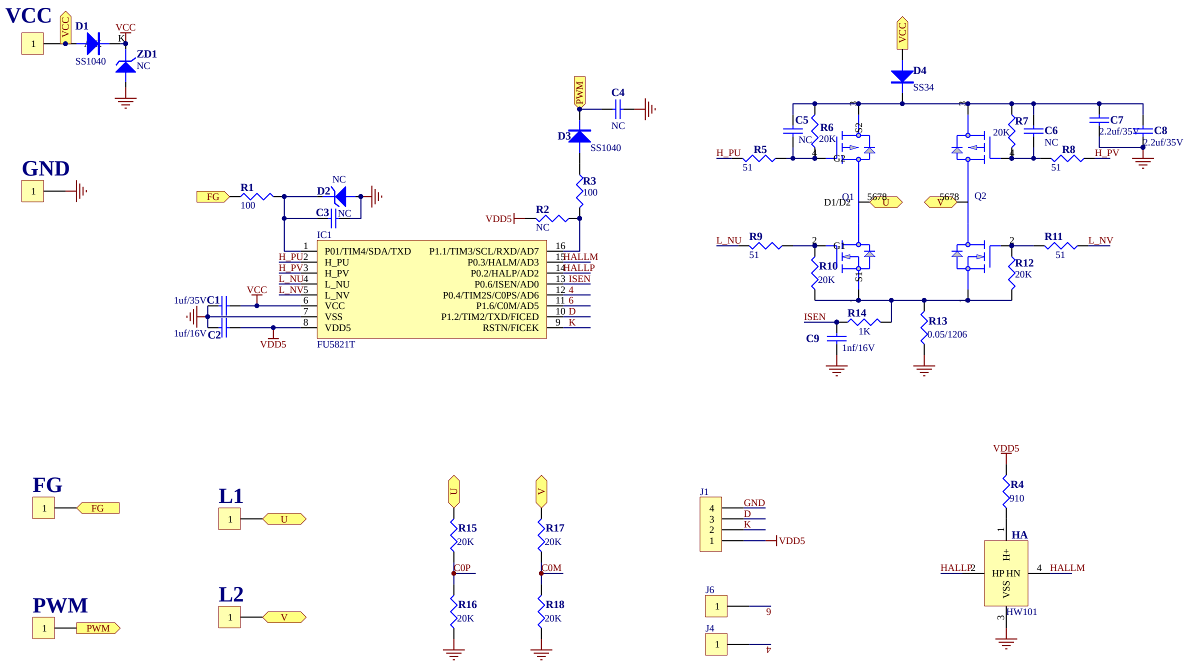


Figure 2-1 EU5821T Demo board circuit layout

2.2 Circuit Description

2.2.1 Power Reverse Connection Protection Circuit

The external DC power provides power to the VCC of the EU5821 through D1 anti-reverse connection diode. The working voltage range of the EU5821 is between 5V to 24V.

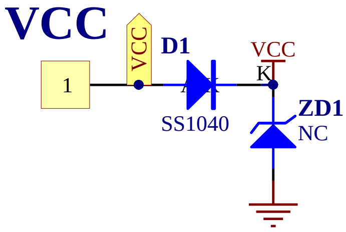


Figure 2-2 Power reverse connection protection circuit

2.2.2 Current Detection Circuit

The current detection circuit of the EU5821 can be used to measure the voltage of sampling resistor. After filtering, the voltage of sampling resistor can be measured by connecting the internal comparator and A/D convertor unit to the ISEN pin to measure sampling current. This circuit is used for current limit protection and over current protection.

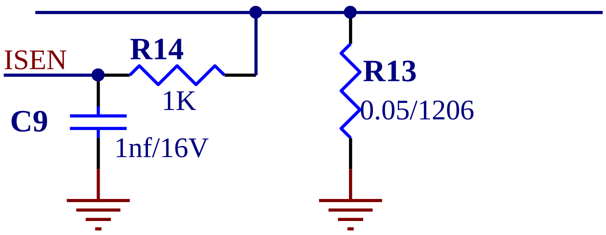


Figure 2-3 Bus current detection circuit

2.2.3 Hall Sensor Circuit

The EU5821 can support either digital or analog Hall sensor. If analog Hall sensor is applied, the VDD5 of the EU5821 provides power to the Hall sensor. The signals of the Hall sensor will be transmitted to the HallM and HallP pins. If digital Hall sensor is applied, the HallP pin shall connect to a 2K pull-up resistor externally.

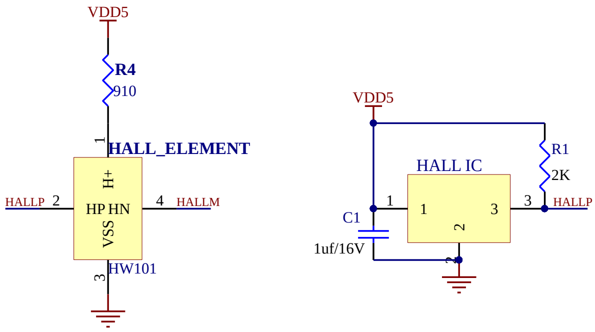


Figure 2-4 Hall-effect sensor circuit

2.2.4 MOSFET Motor Driver Circuit

The MOSFET motor driver circuit is comprised of dual P/N-channel MOSFETs, resistor and capacitor components. It supports high-side P-channel MOSFETs and low-side N-channel MOSFETs operation with the internal pre-driver of the MCU.

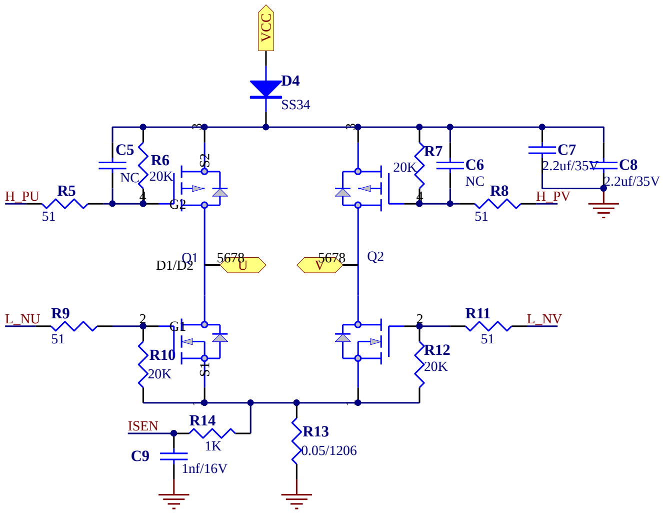


Figure 2-5 MOSFET motor driver circuit

2.2.5 Back Electromotive Force (BEMF) Detection Circuit

The back electromotive force (BEMF) circuit can be used for downwind/upwind detection. This can be realized by connecting the U/V phase to Pin 11 and Pin 12 of the FU8521 chip to detect BEMF after voltage division.

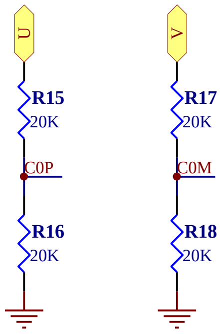


Figure 2-6 BEMF detection circuit

2.2.6 Peripheral Interface

This interface is used to connect to the emulator. Connect the corresponding interface to the emulator as follows: VDD5 to VDD; K to FCK; D to FDA and GND to GND. The terminal is for program debugging and online firmware flashing on the product board.

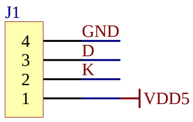


Figure 2-7 Peripheral interface

3 Debugging Instructions

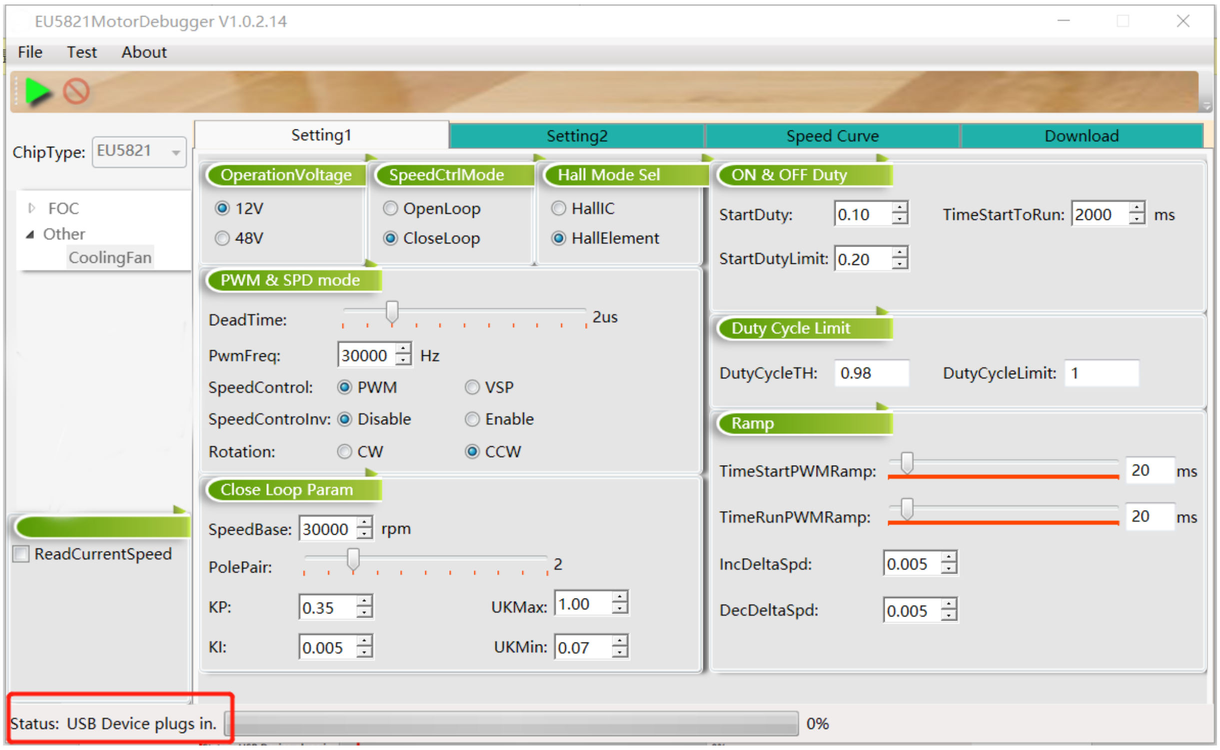
The EU5821 adopts FICE protocol, which allows users to set motor control parameters through the FICE interface to use the features required with the help of the application. Parameters can be written into FLASH.

Instructions for connecting the emulator to the target board are as follows:

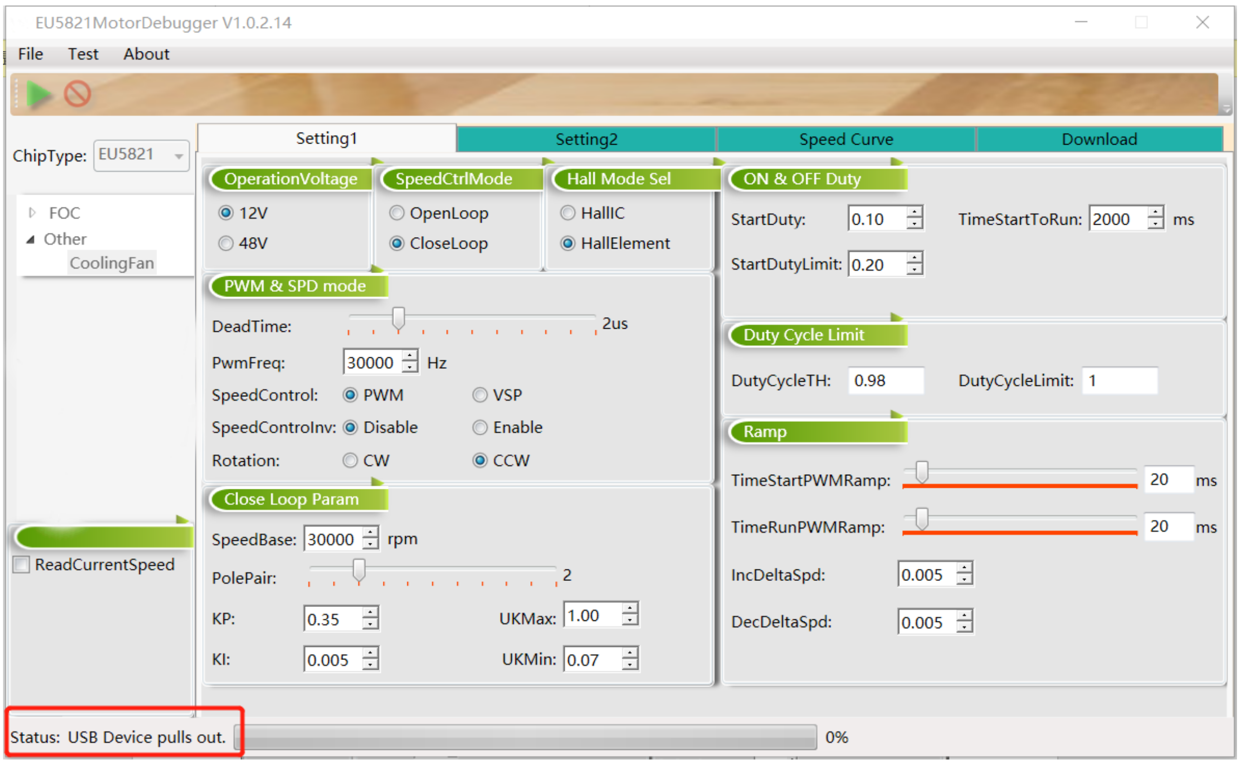
1. Connect VDD5 of the chip pin to the VDD of the emulator;
2. Connect FICEK of the chip pin to the FICEK of the emulator;
3. Connect FICED of the chip pin to the FICED of the emulator;
4. Connect GND of the chip pin to the GND of the emulator.

3.1 Connecting Emulator to Computer

Connect the USB port of the emulator to the computer and the status will be displayed on the bottom left corner of the GUI window. “USB Device plugs in.” will be displayed to indicate the connection between the emulator and the computer is successful.

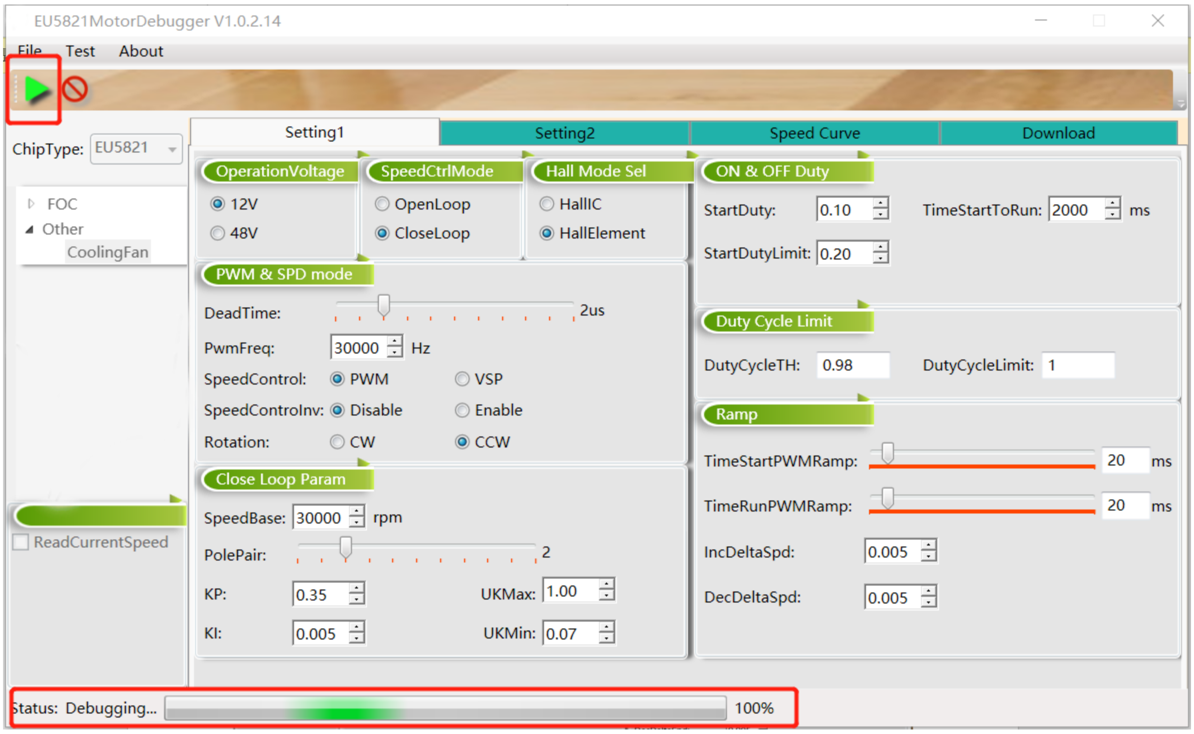


If the window displays a “USB Device pulls out.” message, it means the emulator does not connect to the computer.

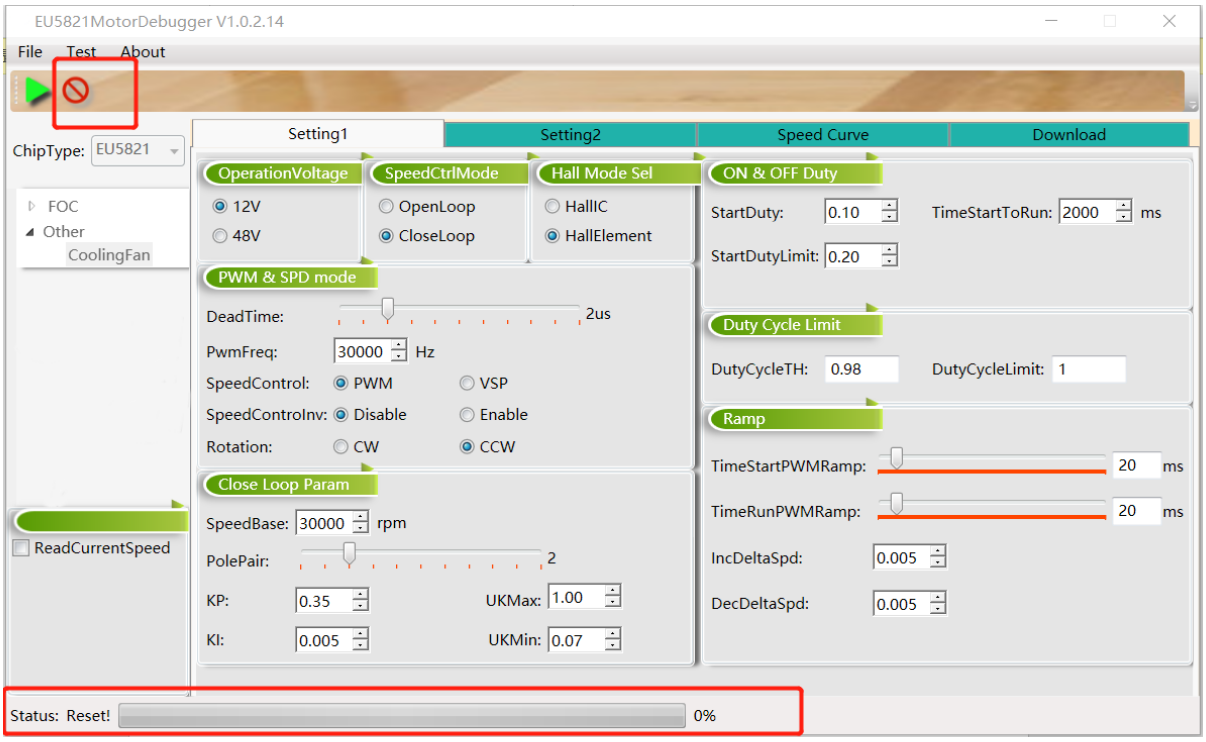


3.2 Debug and Reset

Provide power to the target board and ensure the simulator is connected to the computer successfully. Click the Debug button in the upper left hand corner. The bar will display "Status: Debugging..." to show its status. The progress bar will show 100% to indicate that the program has been downloaded to the chip and ready for execution.



Click the Reset button in the upper left hand corner to reset the chip. The bar will display "Status: Reset!" to indicate that the chip has been reset and stopped running."



3.3 Basic Parameter

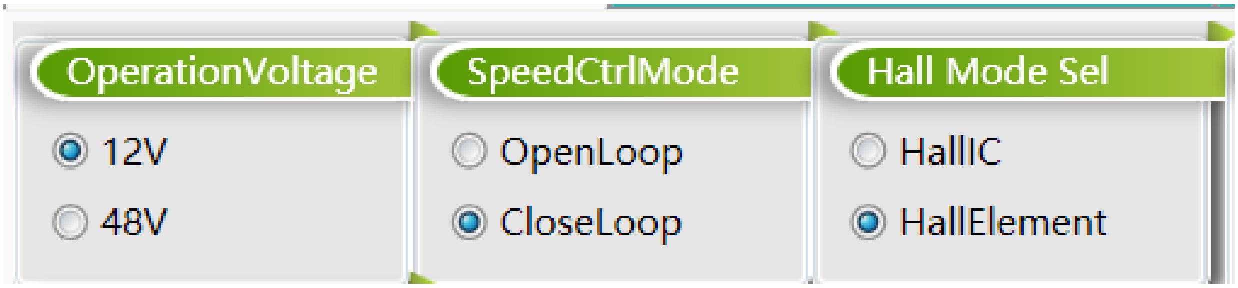


Figure 3-1 Basic parameter

- OperationVoltage

Users can select the working voltage according to the actual circuit. Select 12V mode to drive MOS circuit operation directly by EU5821.

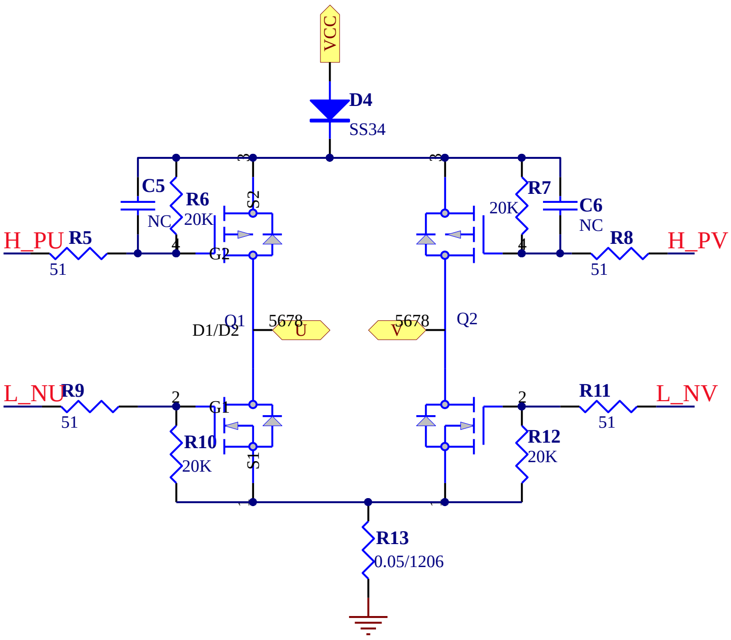


Figure 3-2 MOS circuit driven by 12V mode

The MOS circuit has a triode reverse design (T6 and T7 as shown in Figure 3-3). Select 48V mode under OperationVoltage list.

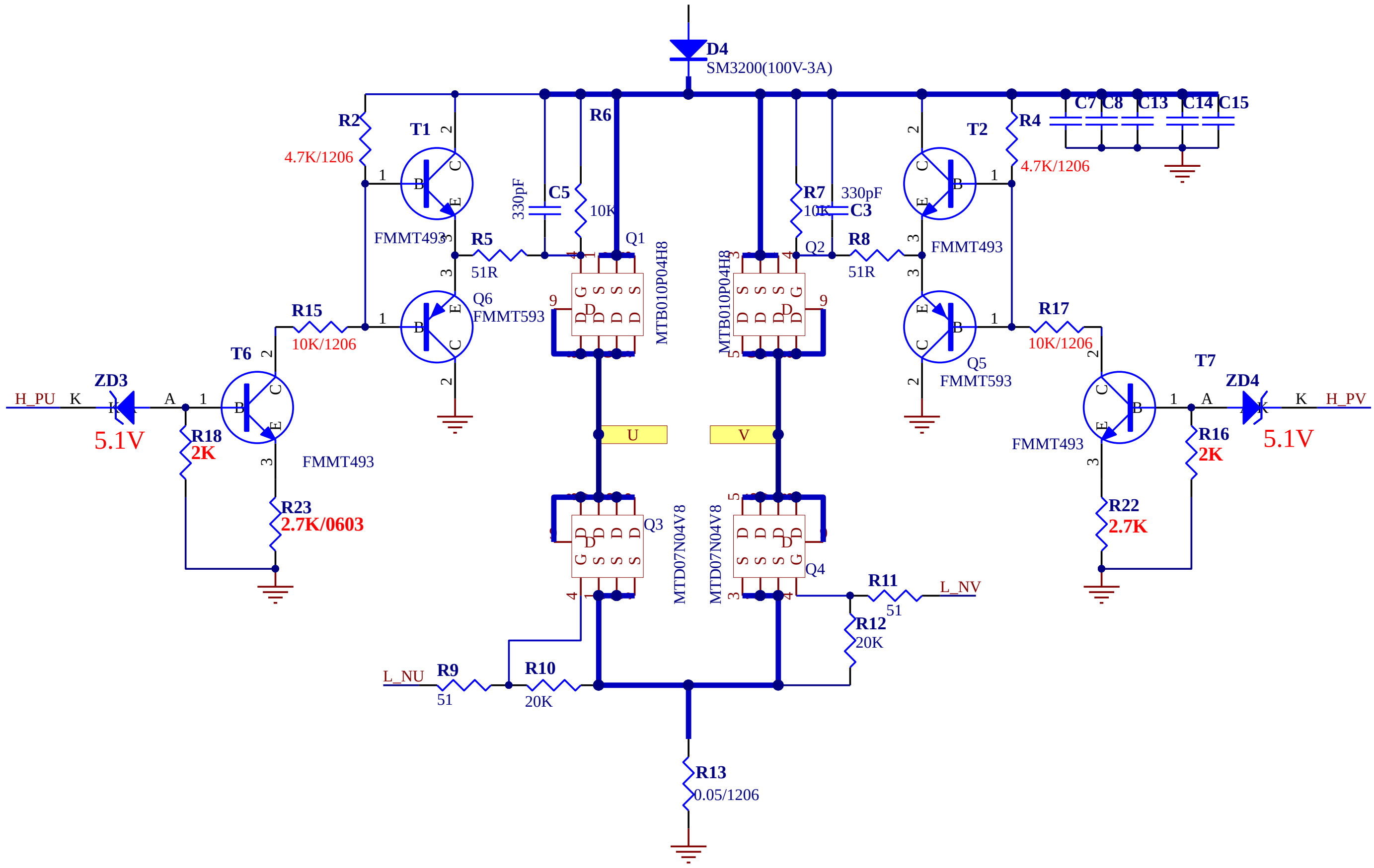


Figure 3-3 MOS circuit driven by 48V mode

- SpeedCtrlMode

Speed control mode: The EU5821 supports voltage open-loop and speed-closed loop control for users to choose from. Users can select either OpenLoop or CloseLoop from the list based on actual needs.

- Hall Mode sel

Hall mode configuration: This option allows users to decide whether a 3-pin digital Hall (Hall IC) or a 4-pin analog Hall (Hall Element) is being used.

3.4 PWM and Speed Mode

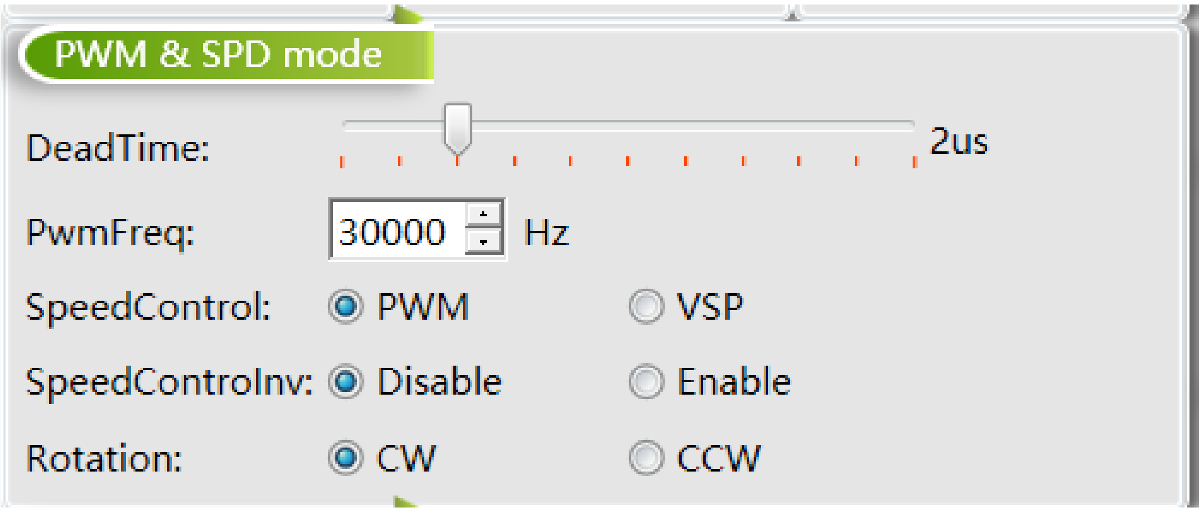


Figure 3-4 PWM and speed mode

- DeadTime

Dead time: The driving circuit of the EU5821 is of an H-bridge structure, which has the risk of simultaneous conduction of the upper and lower bridges. To avoid this risk from happening, DeadTime needs to be adjusted. It is generally set to 1 ~ 10μs.

- PwmFreq

The carrier frequency is the on and off for MOSFET and can be selected according to actual needs. The default setting is 20kHz ~ 30kHz.

- SpeedControl

Speed control: The EU5821 supports PWM regulation and analog voltage regulation. Users can select corresponding regulation method based on their needs.

- SpeedControlnv

Speed control input: PWM inversion operation is not allowed by selecting Disable. If the generated signal is high (duty cycle), it will be true. Select Enable to allow PWM inversion operation. If the generated signal is low (duty cycle), it will be true.

For example, as shown in Figure 3-5, select Disable for forward operation. Otherwise, select Enable for reverse operation, where a triode voltage is applied, as shown in Figure 3-6.

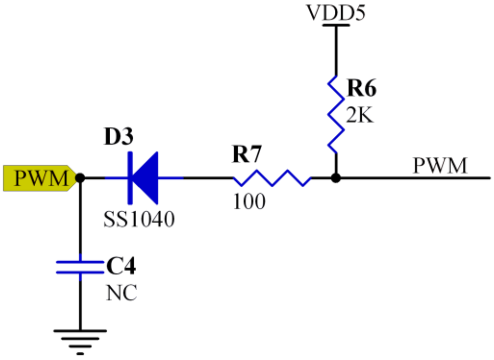


Figure 3-5 PWM forward circuit

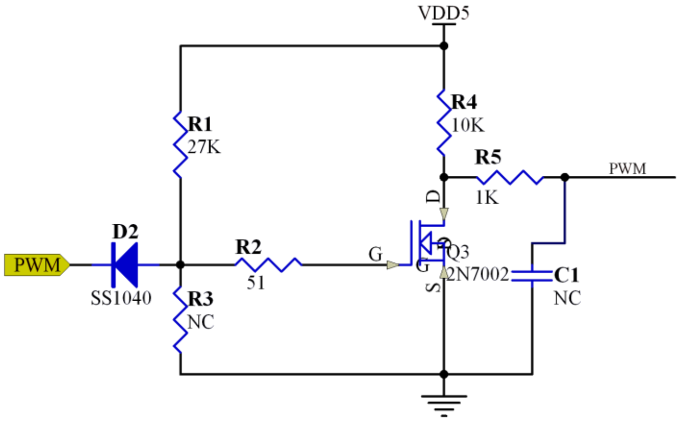


Figure 3-6 PWM reverse circuit

- Rotation

Rotation direction: Select CW to have the motor rotate in clockwise direction. Select CCW to have the motor rotate in counterclockwise direction. That is to say that switching from L1 to L2 can be made via software programming.

3.5 Closed-loop Parameter

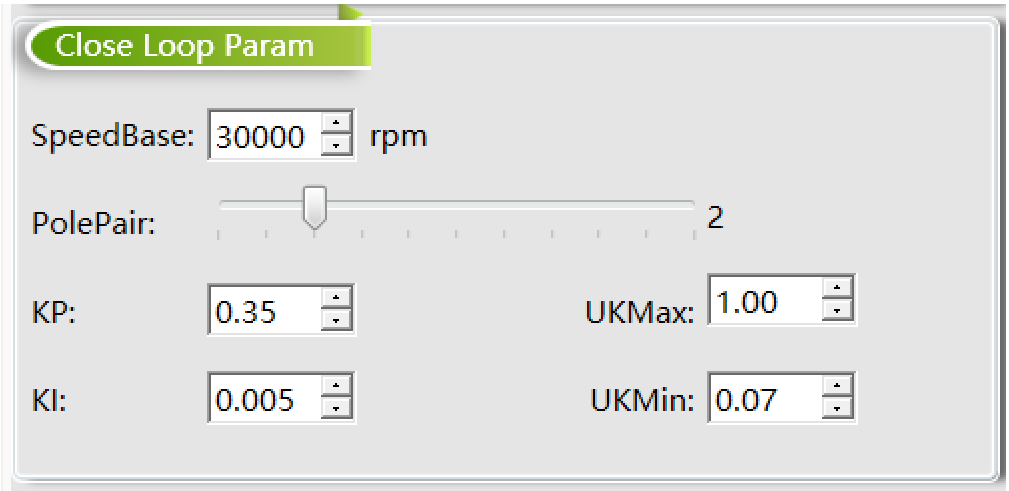


Figure 3-7 Closed-loop parameter

- SpeedBase

The speed reference is set at 1.5 times of the maximum speed. For example, if the maximum speed required is 20000RPM, set the SpeedBase to 30000RPM.

- PolePair

Users can set the number of pole pairs of the motor according to the actual parameters of it. It can be measured as follows: Rotate the motor for one cycle and observe the number of the BEMF cycles displayed on the oscilloscope. The cycle number equals pole pair numbers. For example, for a 4-slot/4-pole motor, the

pole pair number is 2. For a 8-slot/8-pole motor, the pole pair number is 4, and so on.

- KP & KI

If CloseLoop is selected under SpeedCtrlMode, users can set proportional coefficient KP and integral coefficient KI.

Proportional coefficient KP will affect speed response. If KP gain is too large, overshoot will occur. If KP gain is too small, the response to the speed target value will be slower and delay speed regulation response. The recommended value is 0.35.

Integral coefficient KI will affect speed response and steady state. If KI gain is too large, it may cause speed oscillation. The speed to reach final steady state may vary with the same target speed value under different loads. If KI gain is too small, the response to the speed target value will be slower when load changes. The recommended value is 0.005.

- UKMax & UKMin

If CloseLoop is selected under SpeedCtrlMode, users can set close loop maximum output limit UKMax and close loop minimum output limit UKMin.

Close loop maximum output limit: In close loop condition, if the generated duty cycle reaches the set value of UKMax, the UKMax value will be used as output. If the generated duty cycle does not reach the set value of UKMax, the actual speed curve will be used as output.

For example, the target speed can only be reached if the output duty cycle is greater than 80%, and the chip will only output a duty cycle of 80% at the maximum.

Example one: If the output duty cycle is already greater than 80% but still under the target speed, the chip will only output a duty cycle of 80%, as shown in Figure 3-8.

Example two: If the target speed has been reached but the output duty cycle is less than 80%, the chip will output the target speed based on the actual speed curve, as shown in Figure 3-9.

Figure 3-8 UKMax example one

Figure 3-9 UKMax example two

Close loop minimum output limit: In close loop condition, if the generated duty cycle decreases to the set value of UKMin, the UKMin value will be used as output. If the generated duty cycle is greater than the set value of UKMin, the actual speed curve will be used as output.

For example, if the output duty cycle is less than 20% and has already reached the target speed, the chip will only output a duty cycle of 20%.

Example one: If the output duty cycle has to be less than 20% in order to reach the target speed, the chip will only output a duty cycle of 20%, as shown in Figure 3-10.

Example two: If the output duty cycle has to be greater than 20% in order to reach the target speed, the chip will output the target speed based on the actual speed curve, as shown in Figure 3-11.

Figure 3-10 UKMin example one

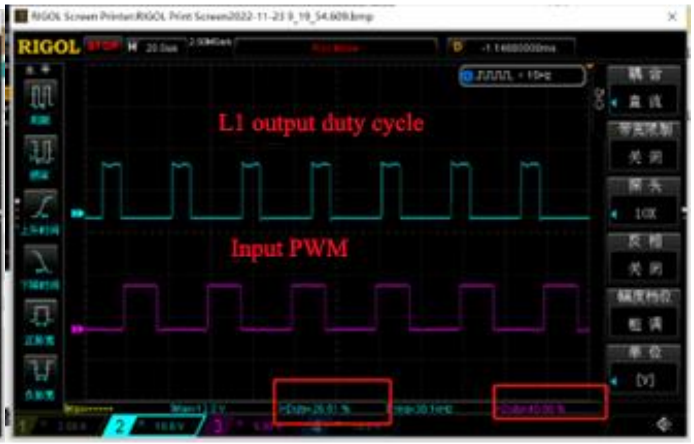


Figure 3-11 UKMin example two

3.6 On & Off Parameter

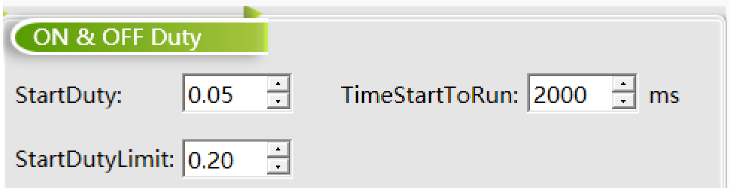


Figure 3-12 On & off parameter

- StartDuty

The startup duty cycle is used to set the initial duty cycle at startup. The greater the StartDuty, the faster the starting speed and the bigger the starting torque.

- TimeStartToRun

This feature is about the running time it requires from startup to operation. It will make a startup ramp (TimeStartPWMRamp) prior to this period. When this period is over, it will make an operation ramp (TimeRunPWMRamp). The recommended value is 2000ms.

- StartDutyLimit

Start duty limit: the software will limit the maximum output duty cycle in the first 4 Hall edges. That is, if the StartDuty is greater than the StartDutyLimit, the software will limit the output duty cycle to the value set by StartDutyLimit for the first 4 Hall edges. If the StartDuty is less than the StartDutyLimit, the software will not limit the output duty cycle for the first 4 Hall edges and start at the StartDuty value.

For example,

Example one: Set StartDuty to 0.3 and StartDutyLimit to 0.2. For the first 4 Hall edges, the software will limit the output duty cycle to 20%.

Example two: Set StartDuty to 0.05 and StartDutyLimit to 0.2. For the first 4 Hall edges, the software will not limit the output duty cycle and will start at 5%.

3.7 Duty Cycle Limit

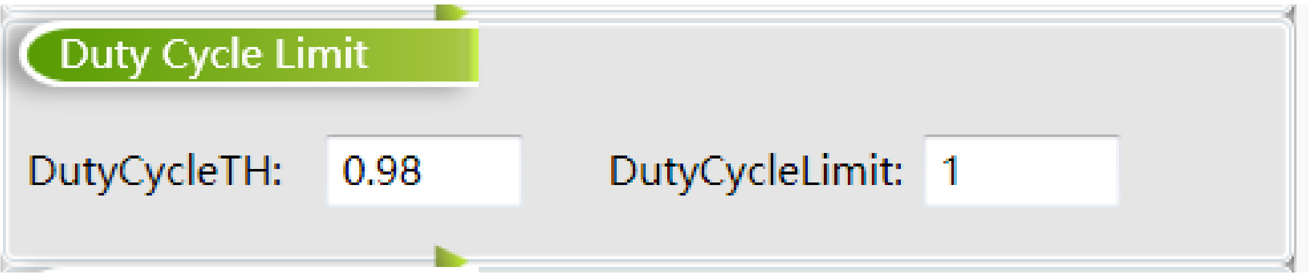


Figure 3-13 Duty cycle limit

- DutyCycleTH & DutyCycleLimit

When the output PWM duty cycle is greater than the DutyCycleTH, the PWM output is limited and the value is set by the DutyCycleLimit.

For example, set DutyCycleTH to 0.80 and DutyCycleLimit to 0.80. Set output duty cycle to be greater than 80% and output limit to 80%.

3.8 Ramp Parameter

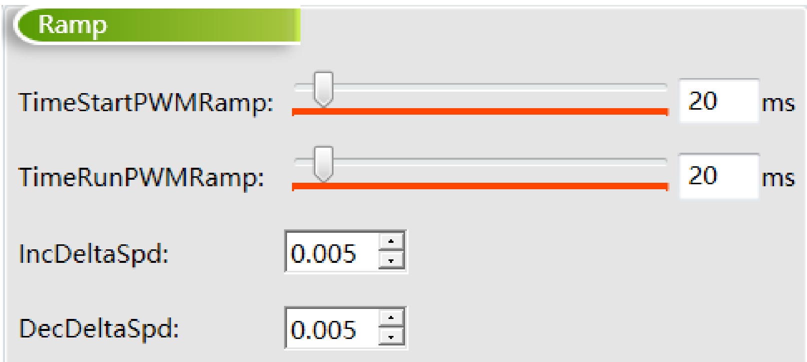


Figure 3-14 Ramp parameter

- TimeStartPWMRamp

Set ramp startup time and update the speed command value once every while during the startup process. The interval can be set at TimeStartPWMRamp. The larger the number, the slower the ramp speed; the smaller the number, the faster the ramp speed.

Example one: Set ramp startup time (TimeStartPWMRamp) to 20ms, speed increment (IncDeltaSpd) to 0.005, speed decrement (DecDeltaSpd) to 0.005, and the startup ramp time will be 3.88s, as shown in Figure 3-15:

Example two: Set ramp startup time (TimeStartPWMRamp) to 40ms, speed increment (IncDeltaSpd) to 0.005, speed decrement (DecDeltaSpd) to 0.005, and the startup ramp time will be 4.88s, as shown in Figure 3-16:

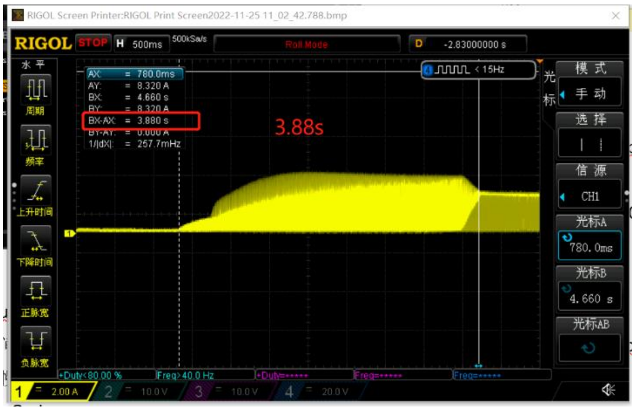


Figure 3-15 Ramp startup time

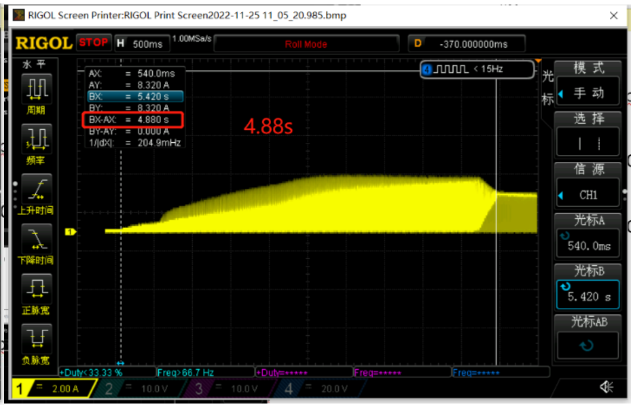


Figure 3-16 Ramp startup time

- TimeRunPWMRamp

Set ramp running time and update the speed command value once every while during the speed regulation process. The interval can be set at TimeRunPWMRamp. The greater the value, the slower the speed regulation response; the smaller the value, the faster the speed regulation response.

Example one: Set ramp running time (TimeRunPWMRamp) to 20ms, speed increment (IncDeltaSpd) to 0.005, speed decrement (DecDeltaSpd) to 0.005, adjust PWM from 50% to 70%, and the ramp time will be 760ms, as shown in Figure 3-17:

Example two: Set ramp running time (TimeRunPWMRamp) to 10ms, speed increment (IncDeltaSpd) to 0.005, speed decrement (DecDeltaSpd) to 0.005, adjust PWM from 50% to 70%, and the ramp time will be 500ms, as shown in Figure 3-18:

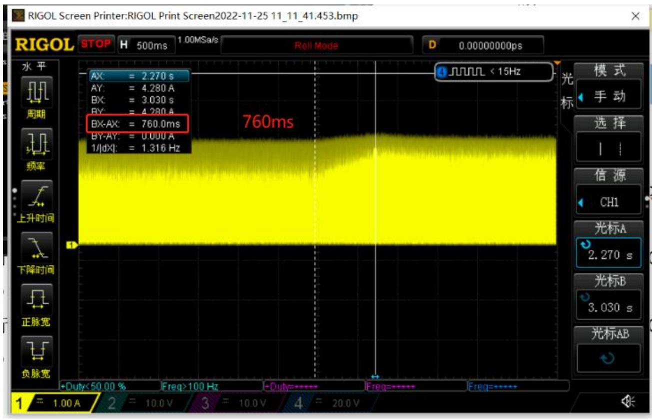


Figure 3-17 Ramp running time

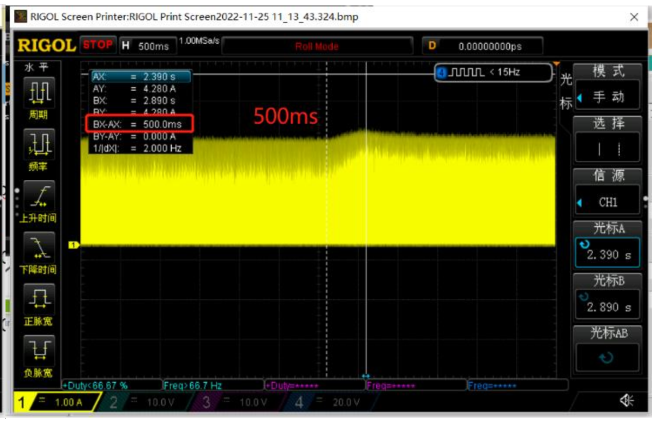


Figure 3-18 Ramp running time

- IncDeltaSpd

Speed increment: In the process of startup or speed regulation, the stepping value IncDeltaSpd of the speed command increases.

Example one: Set ramp startup time (TimeStartPWMRamp) to 20ms, ramp running time (IncDeltaSpd) to 20ms, speed increment (IncDeltaSpd) to 0.003, adjust PWM from 50% to 70%, and the ramp time will be 812ms, as shown in Figure 3-19:

Example two: Set ramp startup time (TimeStartPWMRamp) to 20ms, ramp running time (IncDeltaSpd) to 20ms, speed increment (IncDeltaSpd) to 0.007, adjust PWM from 50% to 70%, and the ramp time will be 316ms, as shown in Figure 3-20:

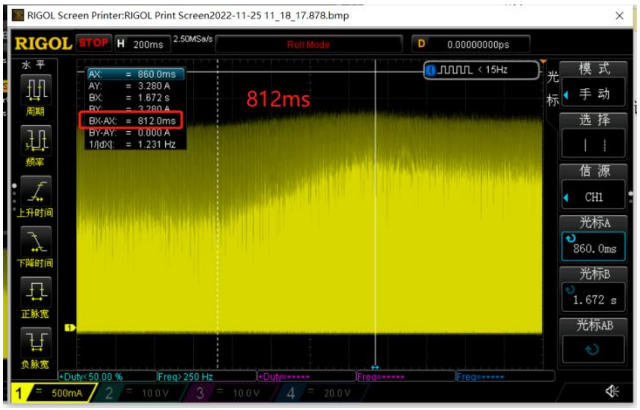


Figure 3-19 Ramp time

Figure 3-20 Ramp time

- DecDeltaSpd

Speed decline: In the process of speed regulation, the stepping value DecDeltaSpd of the speed command decreases.

Users can select speed increment, speed decrement, or decrease ramp time as appropriate to speed up the adjustment speed of the motor. The recommended value is 0.005% ~ 0.007%.

Example one: Set ramp startup time (TimeStartPWMRamp) to 20ms, ramp running time (IncDeltaSpd) to 20ms, speed decrement (DecDeltaSpd) to 0.003, adjust PWM from 70% to 50%, and the ramp time will be 812ms, as shown in Figure 3-21:

Example two: Set ramp startup time (TimeStartPWMRamp) to 20ms, ramp running time (IncDeltaSpd) to 20ms, speed decrement (DecDeltaSpd) to 0.007, adjust PWM from 70% to 50%, and the ramp time will be 320ms, as shown in Figure 3-22:

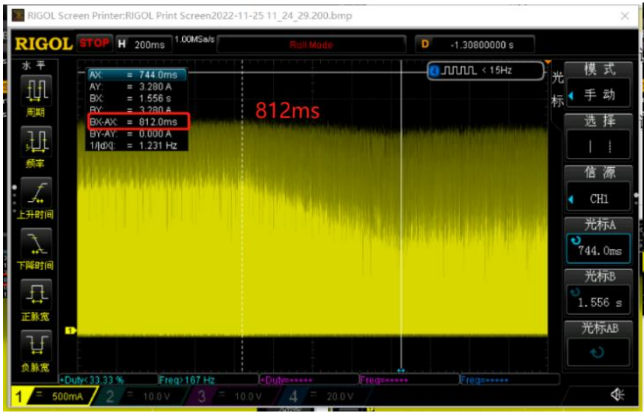


Figure 3-21 Ramp time

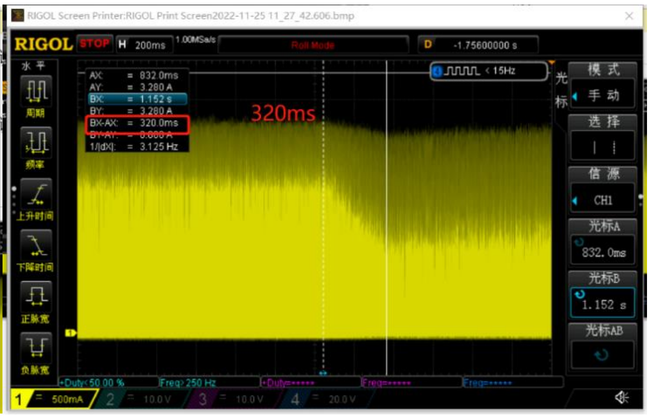


Figure 3-22 Ramp time

3.9 Current Limit/Over Current Protection

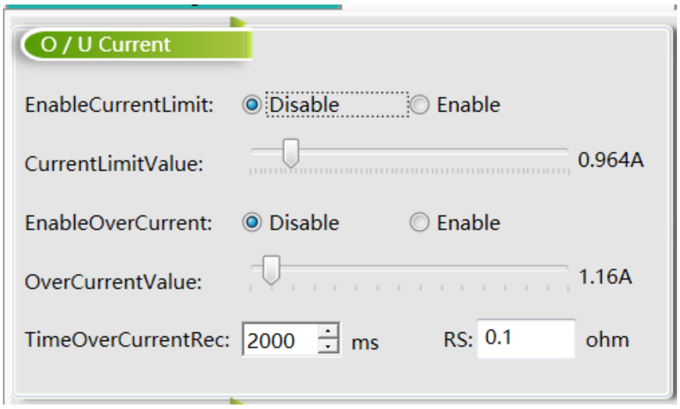


Figure 3-23 Current limit/over current protection

Current limit/over current protection: When the current value is greater than the current limit value, the output voltage will be automatically reduced to the current value. When the current value is greater than the over current value, the over current protection will be triggered and the output is turned off. The setting value of the over current value must be greater than the setting value of the current limit value.

- EnableCurrentLimit

Click Enable to enable current limit protection function. To disable this function, click Disable.

- CurrentLimitValue

Current limit value: It means the peak value of the phase current and can be configured according to user needs.

- EnableOverCurrent

Click Enable to enable over current protection function. To disable this function, click Disable.

- OverCurrentValue

Over current value: It means the peak value of the phase current and can be configured according to user needs.

- TimeOverCurrentRec

Over current protection restart time: After the over current protection is triggered, the motor restarts after the time set by TimeOverCurrentRec is over.

- RS

Sampling motor RS: Users can fill in the resistance value of the sampling resistor according to the actual hardware circuit.

3.10 Undervoltage/Overvoltage Protection

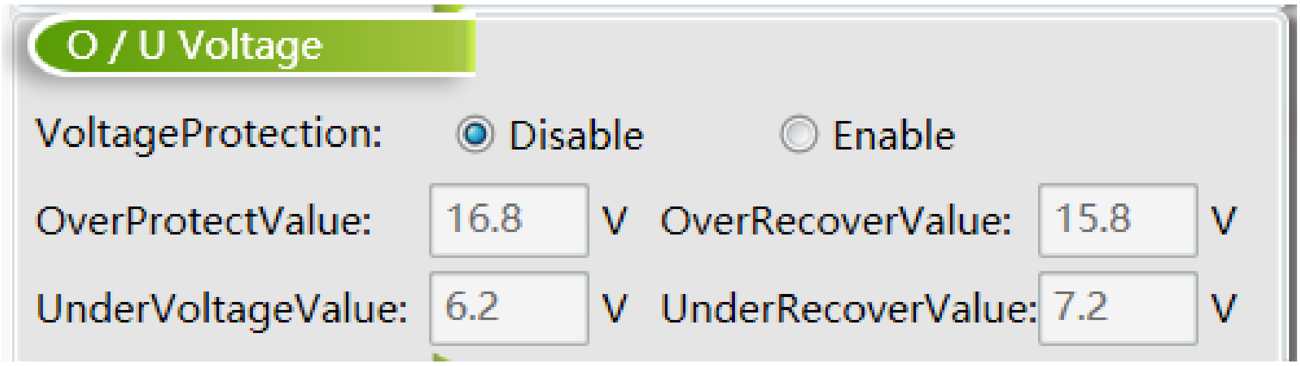


Figure 3-24 Undervoltage/overvoltage protection

- VoltageProtection

Voltage protection feature can be disabled by clicking Disable. To enable it, click Enable.

- OverProtecValue

Overvoltage protection threshold: When the bus voltage is greater than the set value, overvoltage protection will be triggered and the output is turned off.

- OverRecoverValue

Overvoltage protection restore threshold: When the bus voltage is smaller than the set value, the fault state will be cleared and restart the motor.

- UnderVoltageValue

Undervoltage protection threshold: When the bus voltage is smaller than the set value, undervoltage protection will be triggered and the output is turned off.

- UnderRecoverValue

Undervoltage protection restore threshold: When the bus voltage is greater than the set value, the fault state will be cleared and restart the motor.

3.11 Brake Activation and Minimum Filter Speed

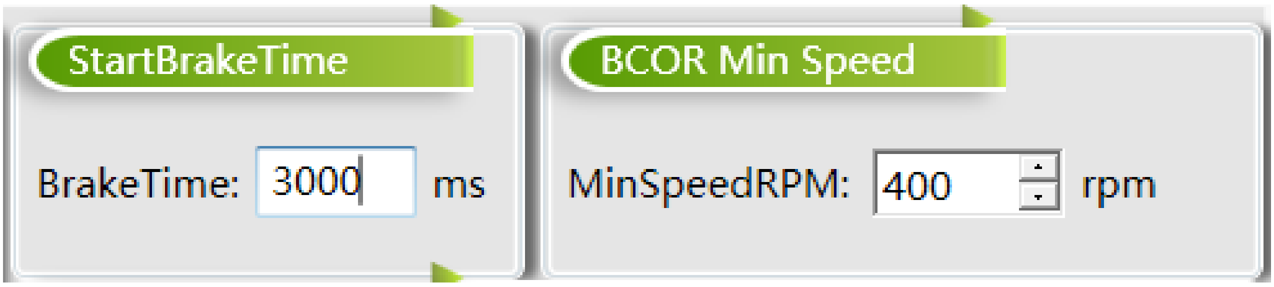


Figure 3-25 Brake activation and minimum filter speed

- StartBrakeTime

Brake activation: Brake before start. The motor is activated after the brake time is over. The brake time length is set by BrakeTime.

For example, set BrakeTime to 3000ms. Switch power supply on and off quickly when the motor is running. The motor will stop and restart after 3000ms, as shown in Figure 3-26:

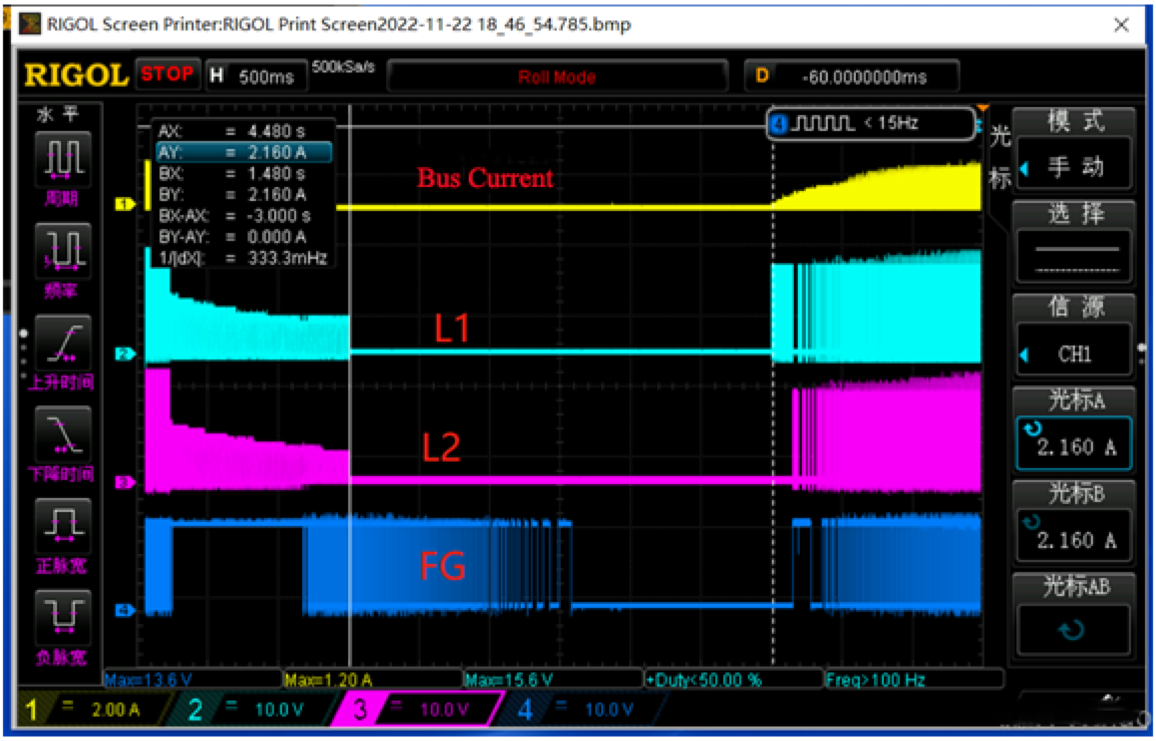


Figure 3-26 Brake activation

- MinSpeedRPM

The minimum supported speed: For motors with 2 pole-pairs, set this value to 400. For motors with 4 pole-pairs, set this value is set to 200, and so on.

3.12 Output Signal FG/RD

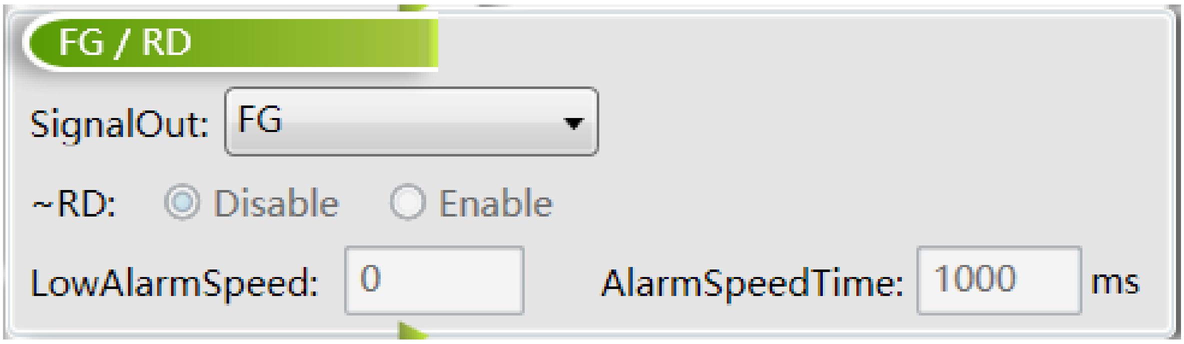


Figure 3-27 Output signal FG/RD

- SignalOut

Under SignalOut list, four signal types are available, including FG, RD, LowAlarmSpdRD and FG + RD.

Select FG as the speed feedback signal. The FG frequency can be set through FAKE_FG on the Speed Curve page to generate virtual FG signal through FAKE_FG. To achieve this, set PWM input range to be within A%-B%. The FG signal frequency is generated at the FAKE_FG coefficient corresponding to B%.

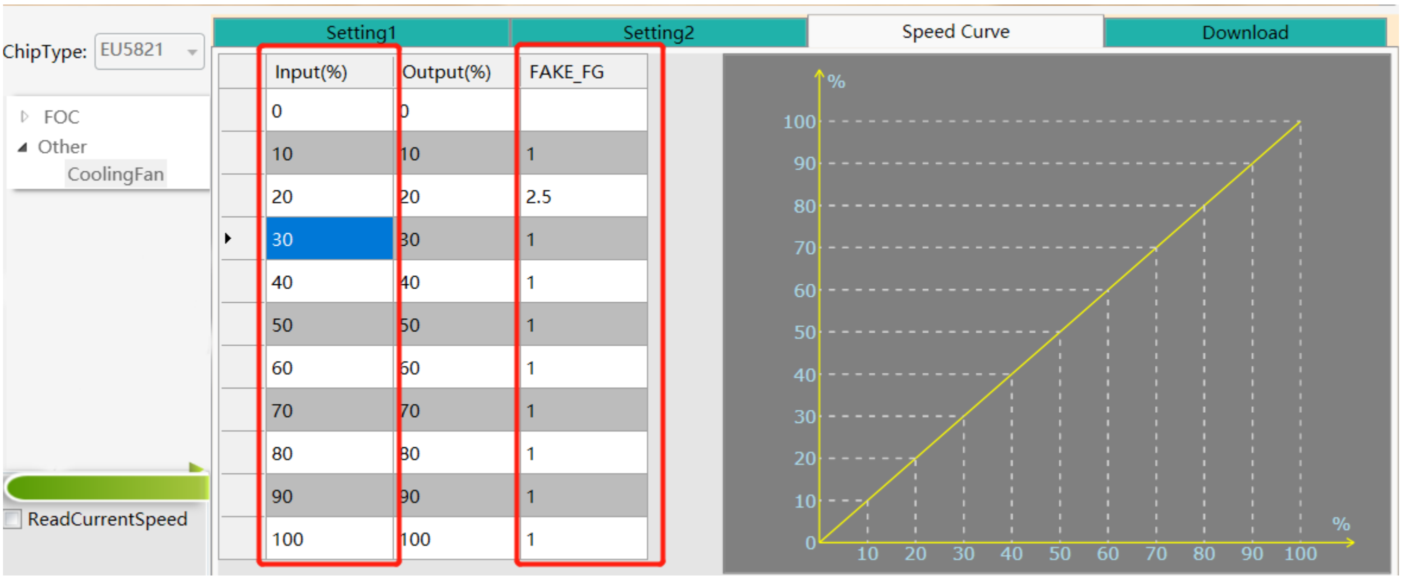


Figure 3-28 Virtual FG settings

Example one: When the filled-in PWM is within the range of 0%-10%, the FG signal frequency is generated at the FAKE_FG coefficient corresponding to 10%. The FAKE_FG coefficient corresponding to Input (10%) is 1. Hence, the frequency of the virtual FG signal is equal to the real FG signal, as shown in Figure 3-29:

Example two: When the filled-in PWM is within the range of 10%-20%, the FG signal frequency is generated at the FAKE_FG coefficient corresponding to 20%. The FAKE_FG coefficient corresponding to Input (20%) is 2.5. Hence, the frequency of the virtual FG signal is 2.5 times of the real FG signal, as shown in Figure 3-30:

Figure 3-29 Virtual FG example one

Figure 3-30 Virtual FG example two

Under SignalOut list, select RD as the stalled signal. The RD signal level will switch during shutdown and normal operation mode.

If set to Disable under ~RD, the signal is high during shutdown and low during normal operation, as shown in Figure 3-31.

If set to Enable under ~RD, the signal is high during normal operation and low during shutdown, as shown in Figure 3-32.

Figure 3-31 RD signal example one

Figure 3-32 RD signal example two

Under SignalOut list, select LowAlarmSpdRD for a low-speed RD alarm. Disable and Enable options are available under ~RD. LowAlarmSpeed and AlarmSpeedTime are configurable.

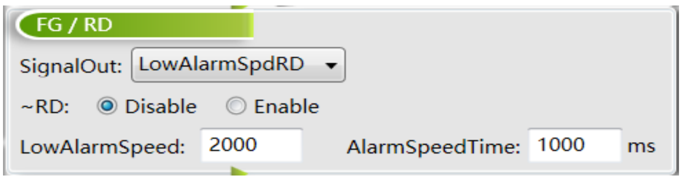
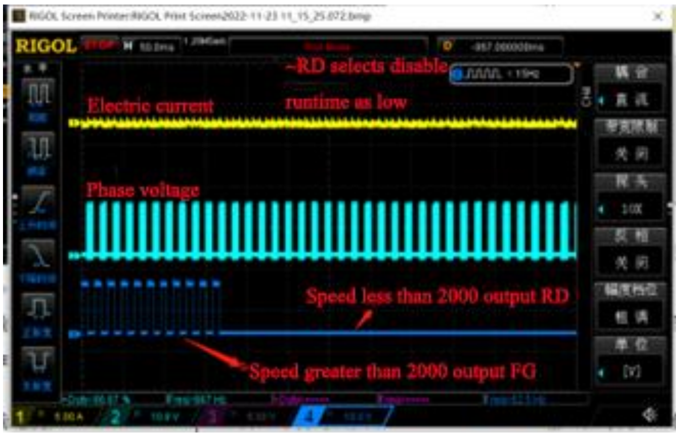


Figure 3-33 Low-speed RD alarm

Example one: When the current speed is slower than the Low Alarm Speed and the lasting time is longer than the Low Alarm Time, the output signal is RD signal. If set to Disable under ~RD, the RD signal is high during shutdown and low during normal operation. If set to Enable, the RD signal is high during normal operation and low during shutdown.



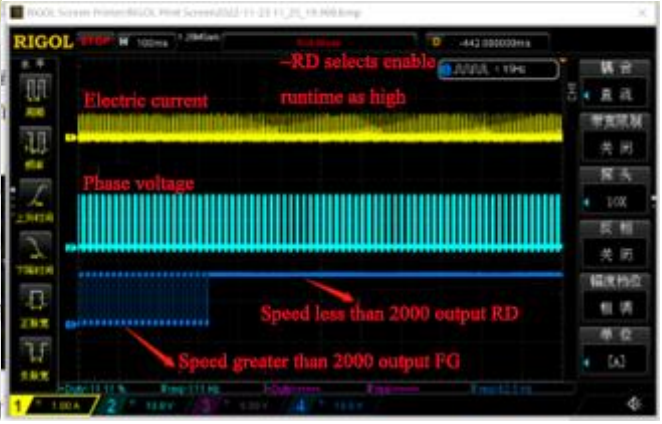


Figure 3-34 Low-speed RD alarm example one

Figure 3-35 Low-speed RD alarm example two

Example two: When the current speed is faster than the Low Alarm Speed and the lasting time is longer than the Low Alarm Time, the output signal is FG signal. Meanwhile, the FG signal frequency is output together with the FAKE_FG, as shown in Figure 3-36 and Figure 3-37.

Figure 3-36 Switching FG at high speed example one

Figure 3-37 Switching FG at high speed example two

Under SignalOut list, select FG + RD to output FG signal for normal operation. The FG signal frequency is output together with the FAKE_FG. The output RD signal is always high when it is stalled or during shutdown, as shown in Figure 3-38 and Figure 3-39.

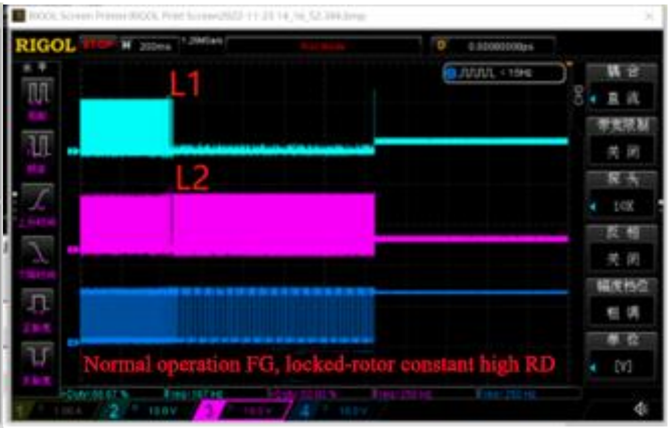


Figure 3-38 FG + RD example one

Figure 3-39 FG + RD example two

3.13 Blocking Protection

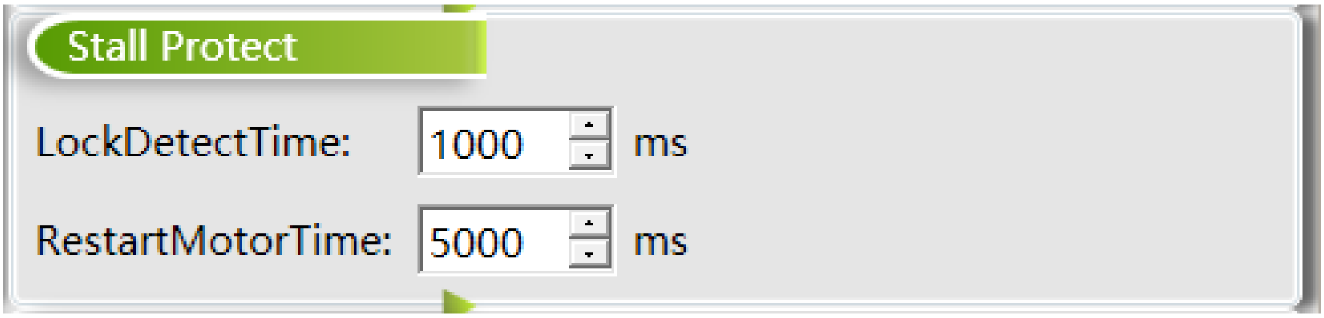


Figure 3-40 Blocking detection

- LockDetectTime

Lock detection time: When the blocked condition exceeds the time set by the LockDetectTime, the protection will be triggered and the output will be turned off.

- RestartMotorTime

Restart motor time: After the blocking protection is triggered and has passed the blocking protection period, the motor will be restarted after the time set by the RestartMotorTime is over.

Figure 3-41 Lock detection example

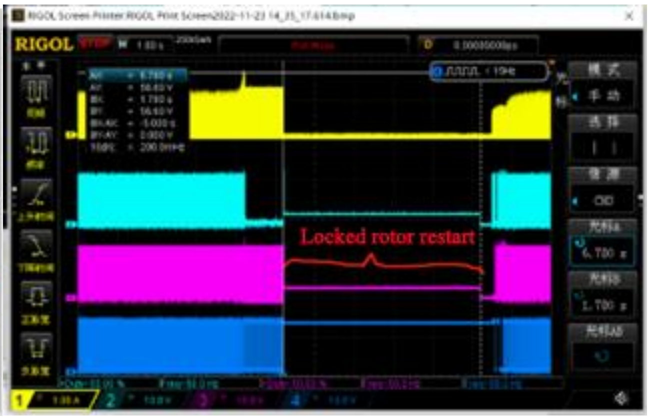


Figure 3-42 Lock restart example

3.14 Setting Slient Angle

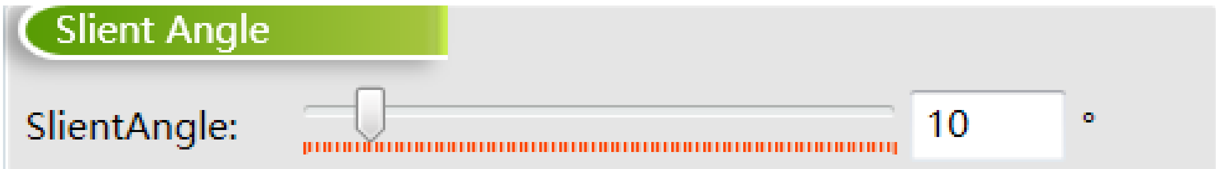


Figure 3-43 Setting slient angle

- SlientAngle

Slient angle: This is the current freewheeling time, as shown in Figure 3-45. Typical recommended value is 10.

3.15 Setting Maximum Lead Angle

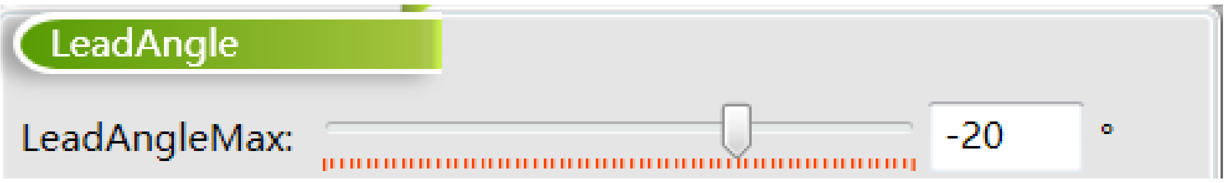


Figure 3-44 Setting lead angle

- LeadAngleMax

Lead Angle Max: The lead angle can be tuned by controlling the phase-switching of the motor in advance to optimize motor efficiency. Typically, the motor can have optimal motor efficiency when the waveform is similar to the saddle-shape type as shown in Figure 3-34.

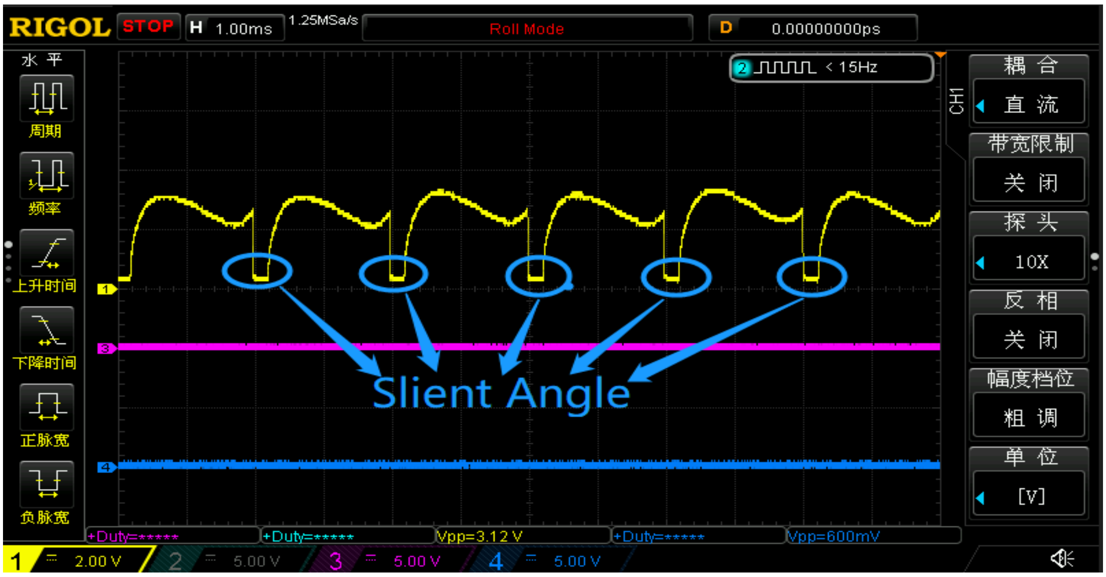


Figure 3-45 Current waveform at busbar with optimal motor efficiency

3.16 Softswitch and Early-turnoff

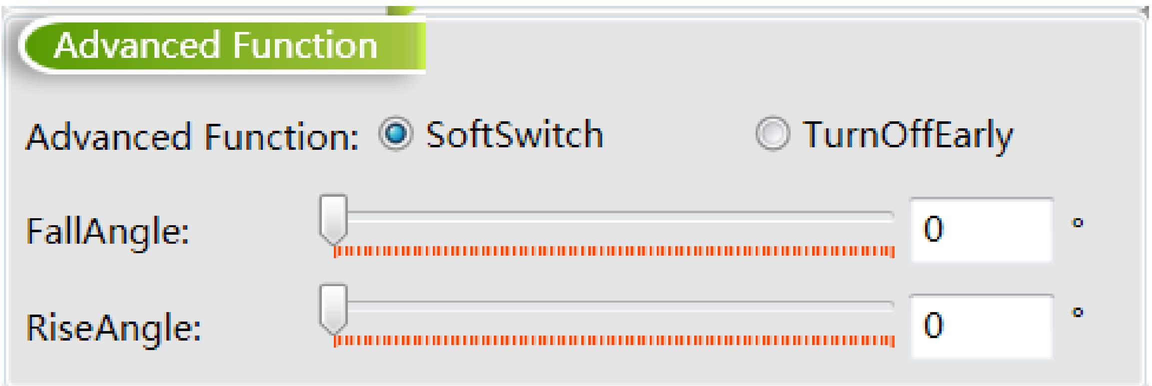


Figure 3-46 Soft switch angle

■ Advanced Function

Select SoftSwitch to mitigate the PWM current spikes and reduce electromagnetic noise. Select TurrnOffEarly for early shutdown.

■ Fall Angle

Fall angle: It can be used to set the downhill angle of the PWM pulse. It can be set to 0 for applications that do not have high requirements for noise reduction.

■ Rise Angle

Rise angle: It can be used to set the uphill angle of the PWM pulse. It can be set to 0 for applications that do not have high requirements for noise reduction.

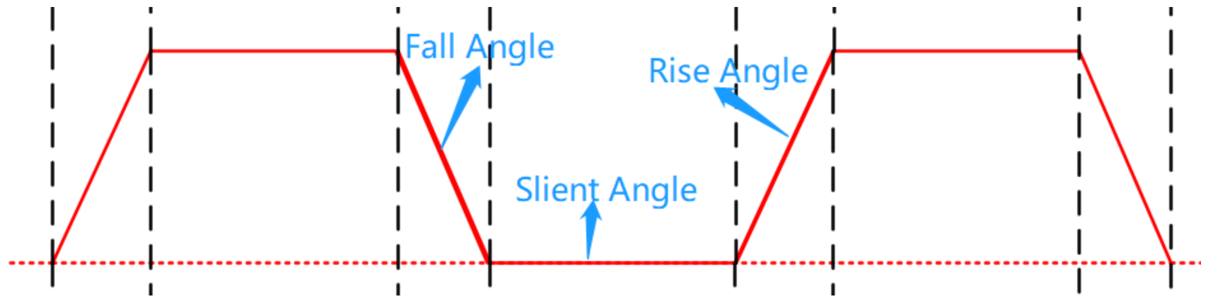


Figure 3-47 Softswich schematic diagram

For example, set Fall Angle to 0 and Rise Angle to 0, as shown in Figure 3-38. Set Fall Angle to 20 and Rise Angle to 20, as shown in Figure 3-39.

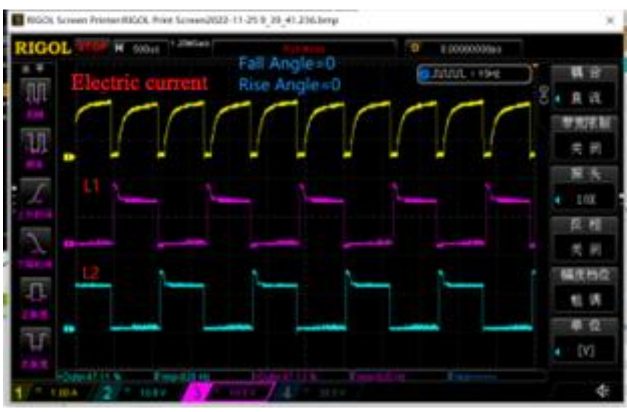


Figure 3-48 Softswitch angle set to 0°

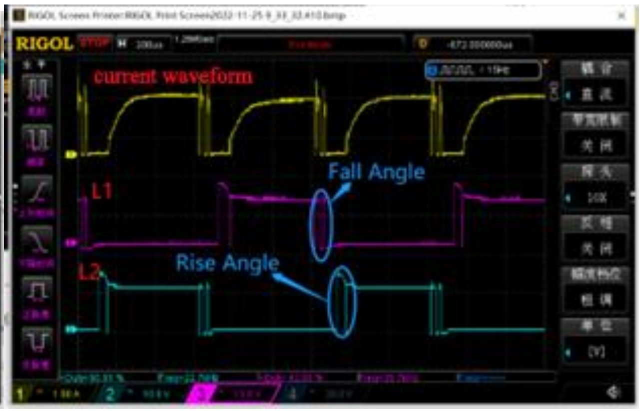


Figure 3-49 Softswitch angle set to 20°

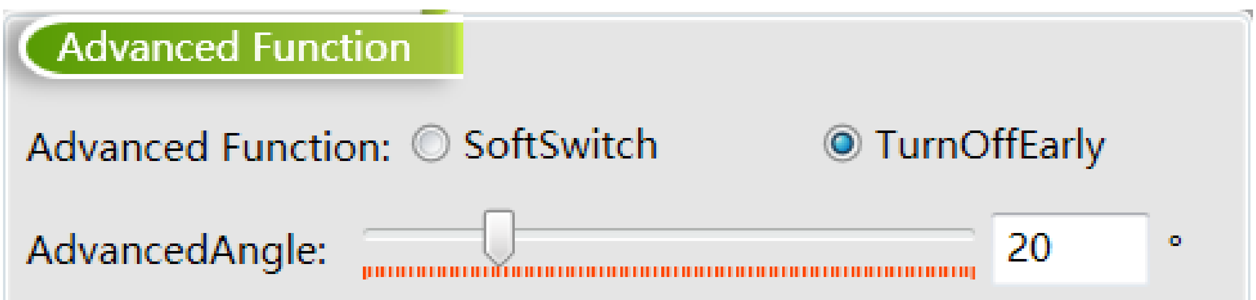


Figure 3-50 Early-turnoff degree setting

Select TurrnOffEarly for early turn-off and turn off the output in advance during commutation.

- AdvancedAngle is the angle set for advance turnoff.

For example, under Advanced Function, select TurrnOffEarly and set Advanced Angle to 0°, as shown in Figure 3-51. Set Advanced Angle to 20°, as shown in Figure 3-52.

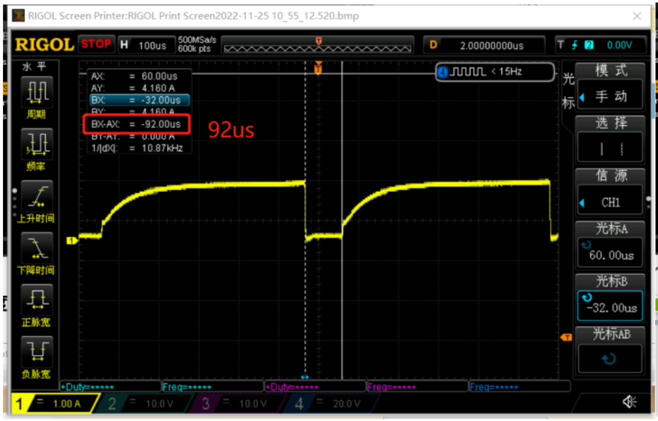


Figure 3-51 Advance turn-off at 0°

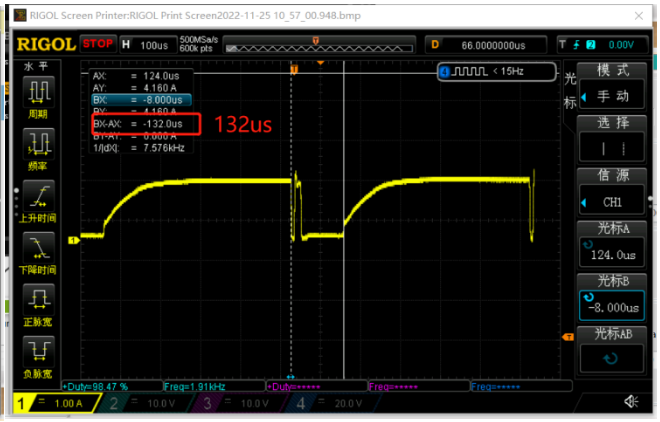


Figure 3-52 Advance turn-off at 20°

3.17 Debug of Speed Curve

Setting Open-loop Curve:

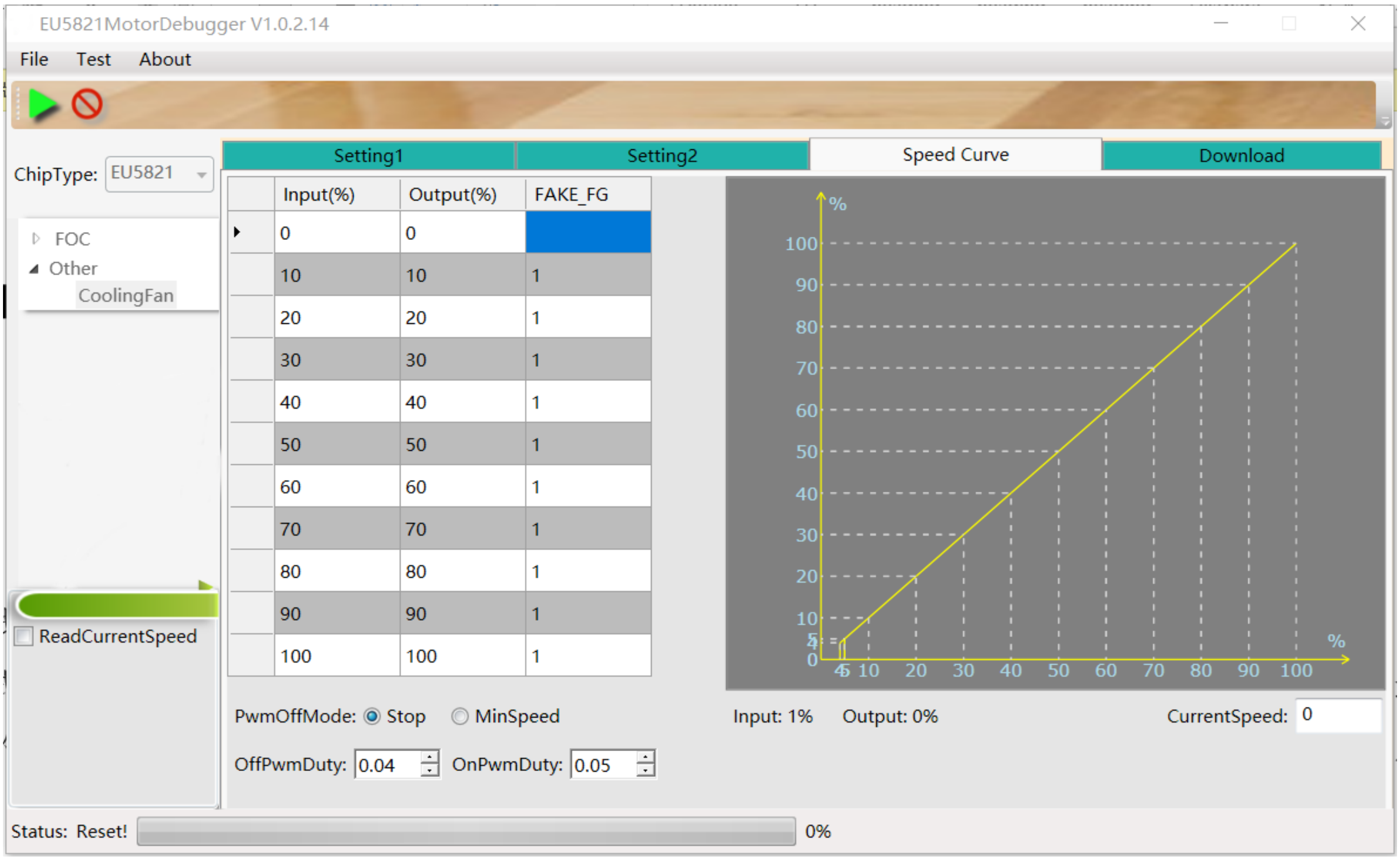


Figure 3-53 Debug of speed curve

In open-loop mode, the horizontal axis represents PWM duty cycle (input) in percentage, while the vertical axis represents voltage duty cycle (output) in percentage. During the test, set the same value for Input (%) and Output (%), as shown in Figure 3-53. Download the program to the chip for testing and read the output duty cycle of the target speed.

For example, if the PWM input is 20% duty cycle, and the required target speed is 2500RPM. If the PWM input is 30% duty cycle, and the required target speed is 3500RPM.

Step 1: Test with the program downloaded previously and adjust PWM input signal. Record the duty cycle of the PWM input signal when the motor speed is 2500RPM. Move on and adjust the PWM input signal, and record the duty cycle of the PWM input signal when the motor speed is 3500RPM.

It is assumed that the PWM input signal value obtained is 18% when the motor speed reaches 25000RPM and the PWM input signal value obtained is 27% when the motor speed reaches 3500RPM.

Step 2；Fill in 18% in Output(%) corresponding to Input(%) 20%. Fill in 27% in Output(%) corresponding to Input(%) 30%, as shown in Figure 3-54.

	Input(%)	Output(%)	FAKE_FG
	0	0	
	10	10	1
▶	20	18	1
	30	27	1

Figure 3-54 Open loop curve example

3.18 Setting Closed-loop Curve:

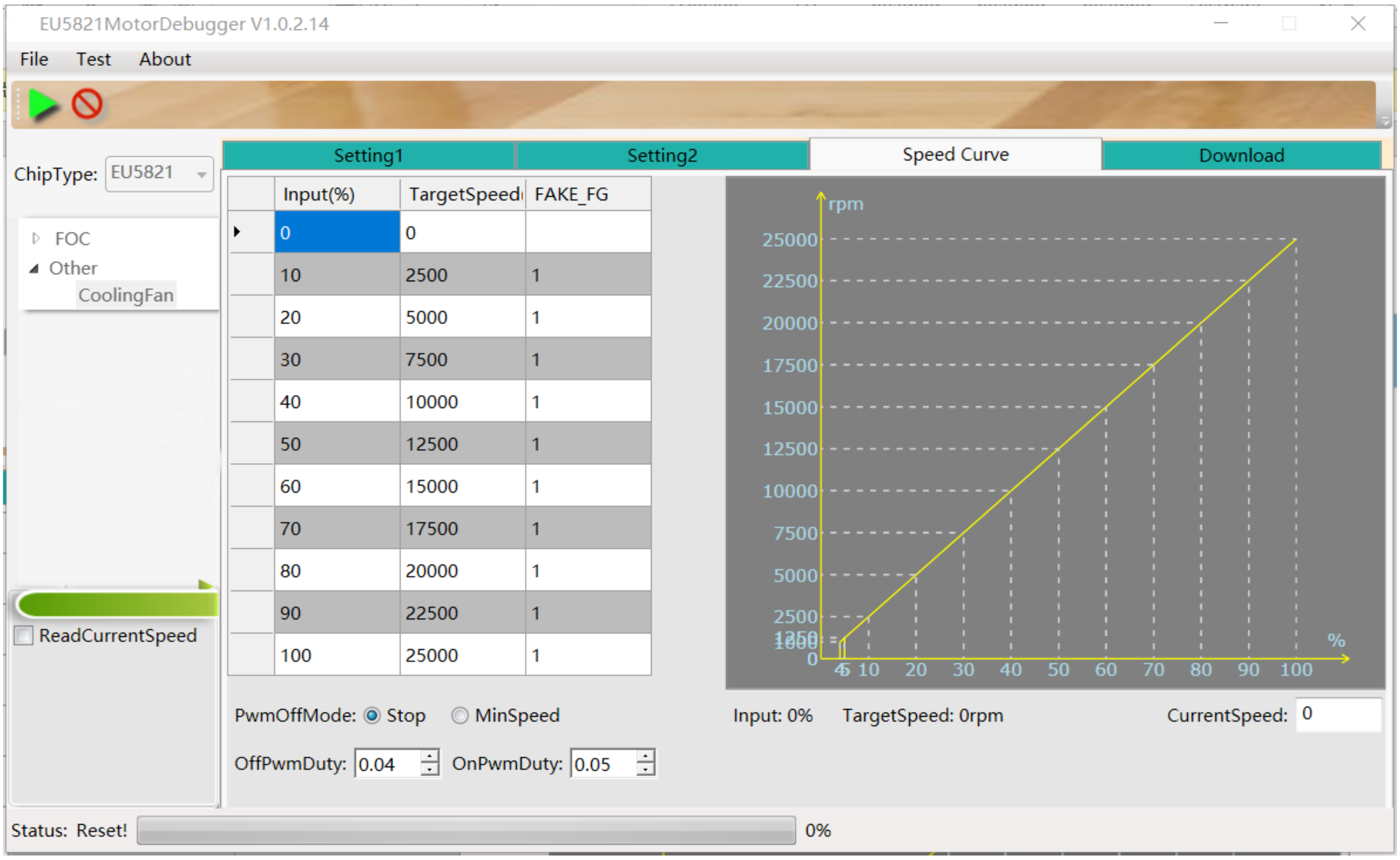


Figure 3-55 Debug of speed curve

In closed-loop mode, the horizontal axis represents PWM duty cycle (input) in percentage, while the vertical axis represents target speed. Simply fill in the target speed value corresponding to PWM duty cycle (input).

For example, if the PWM input is 15% duty cycle, and the required target speed is 3000RPM. Fill in 15% in Input(%) on the Speed Curve page. Fill in 3000 in TargetSpeed to generate a corresponding speed curve.

- PwmoffMode

Select Stop. If the input PWM's signal duty cycle is smaller than the value set in OffPwmDuty, the motor stops. If the input PWM's signal duty cycle is greater than the value set in OffPwmDuty, the motor starts.

Select Minspeed. If the input PWM's signal duty cycle is smaller than the value set in OnPwmDuty, the motor output is maintained at the OnPwmDuty setting value. Then, the FG output frequency is output according to the duty cycle corresponding to OnPwmDuty.

- ReadCurrentSpeed

If ReadCurrentSpeed is enabled, the system will read and display real-time current speed.

4 Flashing and Verification

4.1 Parameter Configuration and Setting Saved

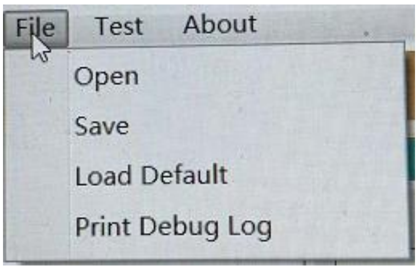


Figure 4-1 Parameter configuration and setting saved

The configured parameters can be saved as a PDF file by clicking Save to keep current interface configuration. The PDF file of the interface configuration can be accessed by clicking Open and selecting file path. Load Default to import parameters is set by default.

4.2 Reverse Display Feature

The reverse display function can be used to display the parameters in a .bin file in a reverse manner for users to know the parameters corresponding to the .bin file.

Instructions: Hover to the far left side of the interface. When a hand icon appears, drag to the right with the left button clicked. A Showback icon will appear. Click Showback to import the .bin file and the corresponding parameters will be displayed.

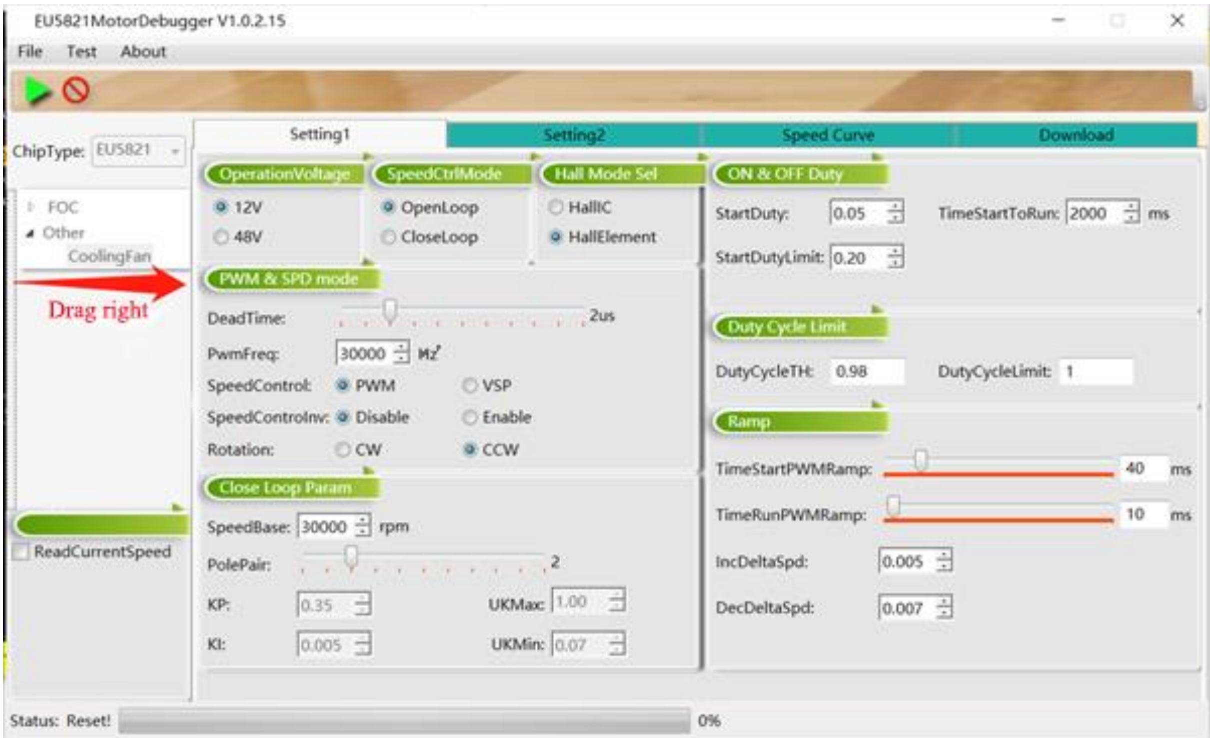


Figure 4-2 Instructions for reverse display

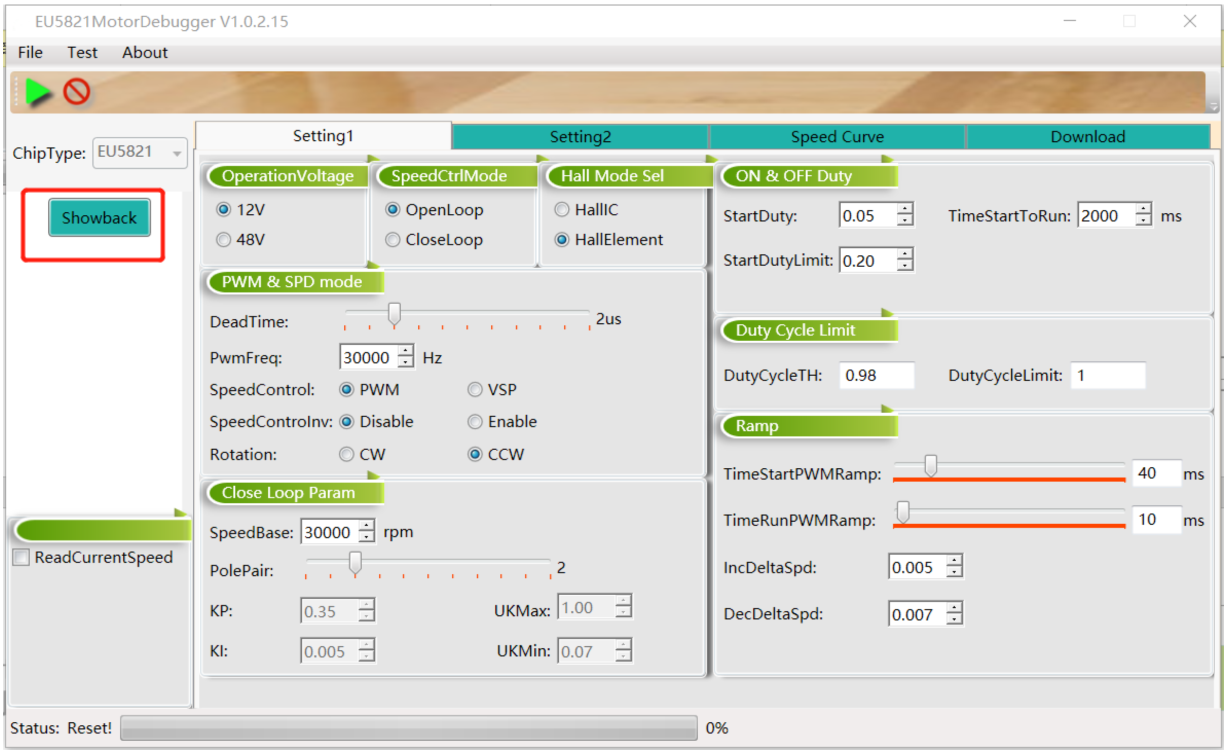


Figure 4-3 Reverse display operation

4.3 Flashing

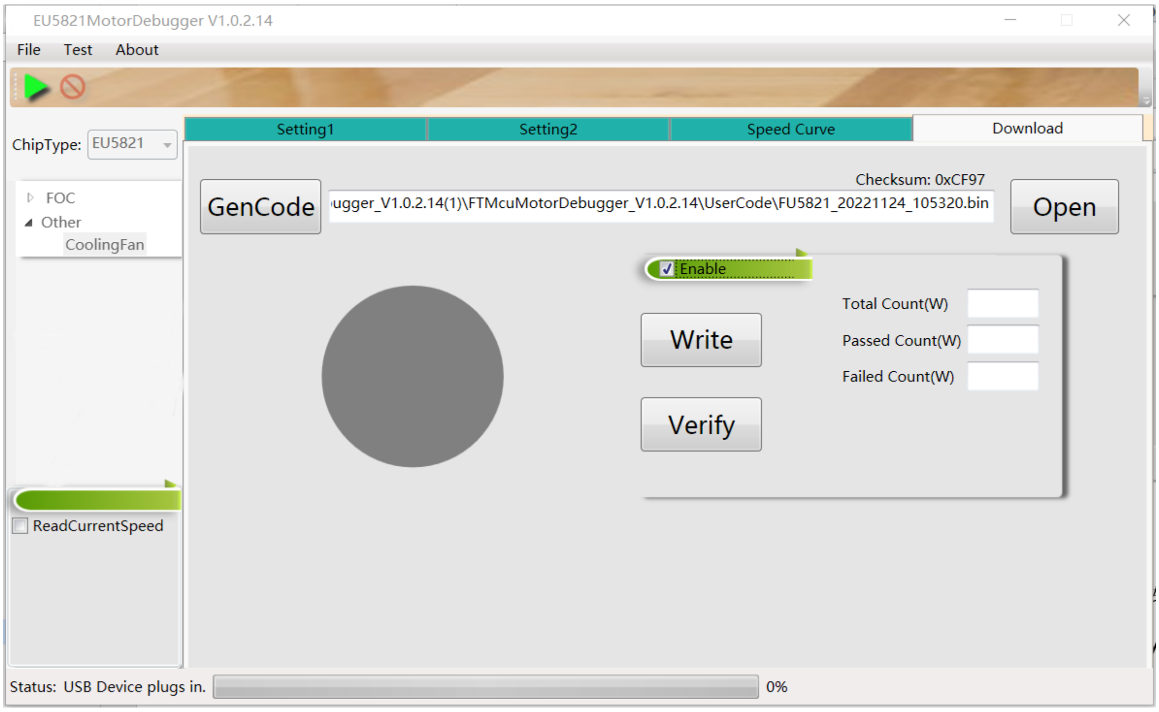


Figure 4-4 Flashing

After parameter debugging is completed, users can click GenCode to generate Bin program. The CRC check code will be generated at the same time and saved under default path.

Click Enable and Write button to flash the generated Bin program. Click Verify to read the verification code corresponding to the program in the chip.

The Open function can be used to import the Bin program of the programming program. Click Write to flash the imported Bin program. Click Verify to read the verification code corresponding to the program in the chip.

Flashing records (including Total Count, Passed Count and Failed Count) are also available.

5 Revision History

Rev.	Changes	Effective Date	Revised by
V1.1	First release，Translated from English note V1.1	2023/04/25	Bobsare

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If there are any differences between the Chinese and the English contents, please take the Chinese version as the standard.

Fortior Technology Co., Ltd.

(Singapore)：1003 Bukit Merah Central, #04-22, INNO Center,(s)159836

Customer service:info@fortiortech.com

URL: http://www.fortiortech.com/global/