
A quick start-up guide for the EVLPOWERSTEP01 evaluation system

By Dennis Nolan

Main components	
powerSTEP01	System-in-package integrating microstepping controller and 10 A power MOSFETs
EVLPOWERSTEP01	System-in-package integrating microstepping controller and 10 A power MOSFETs demonstration board

Purpose and benefits

The objective of this design note is to provide a quick starting guide to get you “up and running” on the STMicroelectronics EVLPOWERSTEP01 evaluation with a minimum of time and effort. This note will not cover, by any means, all of the features of the powerstep01 or its evaluation board, but we will get your stepper motor spinning and under control.

Required Hardware and Software

The hardware and software required to set up this configuration is:

1. EVLPOWERSTEP01 evaluation board (pictured in figure 1).
2. STEVAL-PCC009V2 communication bridge board (pictured in figure 1)
3. Conventional bipolar stepper motor (not much fun without this)
4. DC power supply capable of 1A or more (most commonly around 24 Vdc)
5. Mini USB cable for connection back to your PC
6. Ribbon cable for SPI port link between boards (should be included with eval boards)
7. “red and black” power cable to connect from power supply to EVLPOWERSTEP01.
8. Installed version of the SPINFamily GUI software on your PC (available from ST web site)

Connect the system as shown in Figure 1. Be mindful of the correct polarity for the DC power, but the polarity, or even which coil goes to which connector, for the motor wires is not important as it only determines the convention of clockwise vs. counter-clockwise. Do be sure that you do not connect one wire from coil A and the other from coil B to the same connector. A quick check with an ohmmeter will verify which two wires constitute a coil.

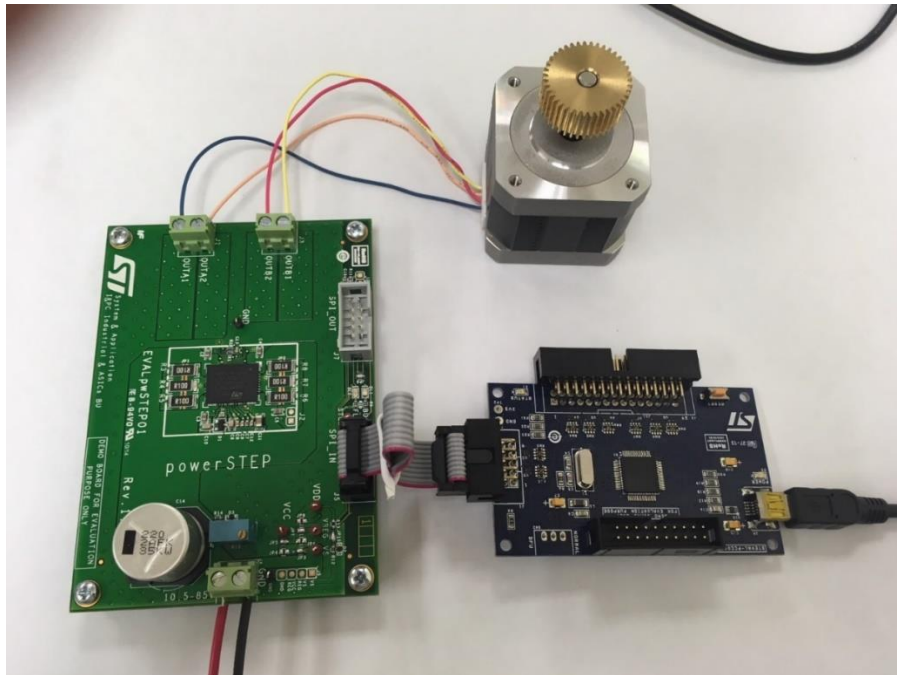


Figure 1. Connecting the evaluation system and motor

Now energize the DC supply and open the GUI. You will be presented with the device selection screen as shown in Figure 2. Select PowerSTEP01.

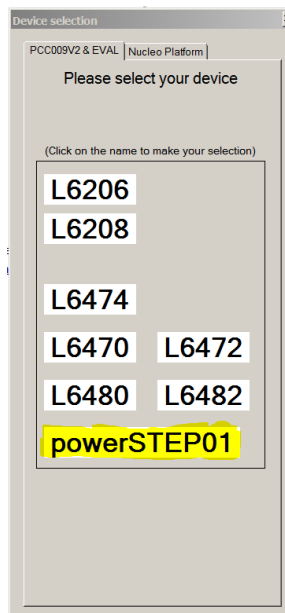


Figure 2. Device Selection in GUI

You will now be presented with the main control screen as shown in Figure 3. Click the “connect” icon (upper left, highlighted). The status line at the very bottom of the screen should change to indicate that the board is connected. At this point, in the status area, the GUI will generally be showing one of more red fault indicators. Click the “read and clear status” icon (lower right, highlighted) and the red fault indicators should clear.

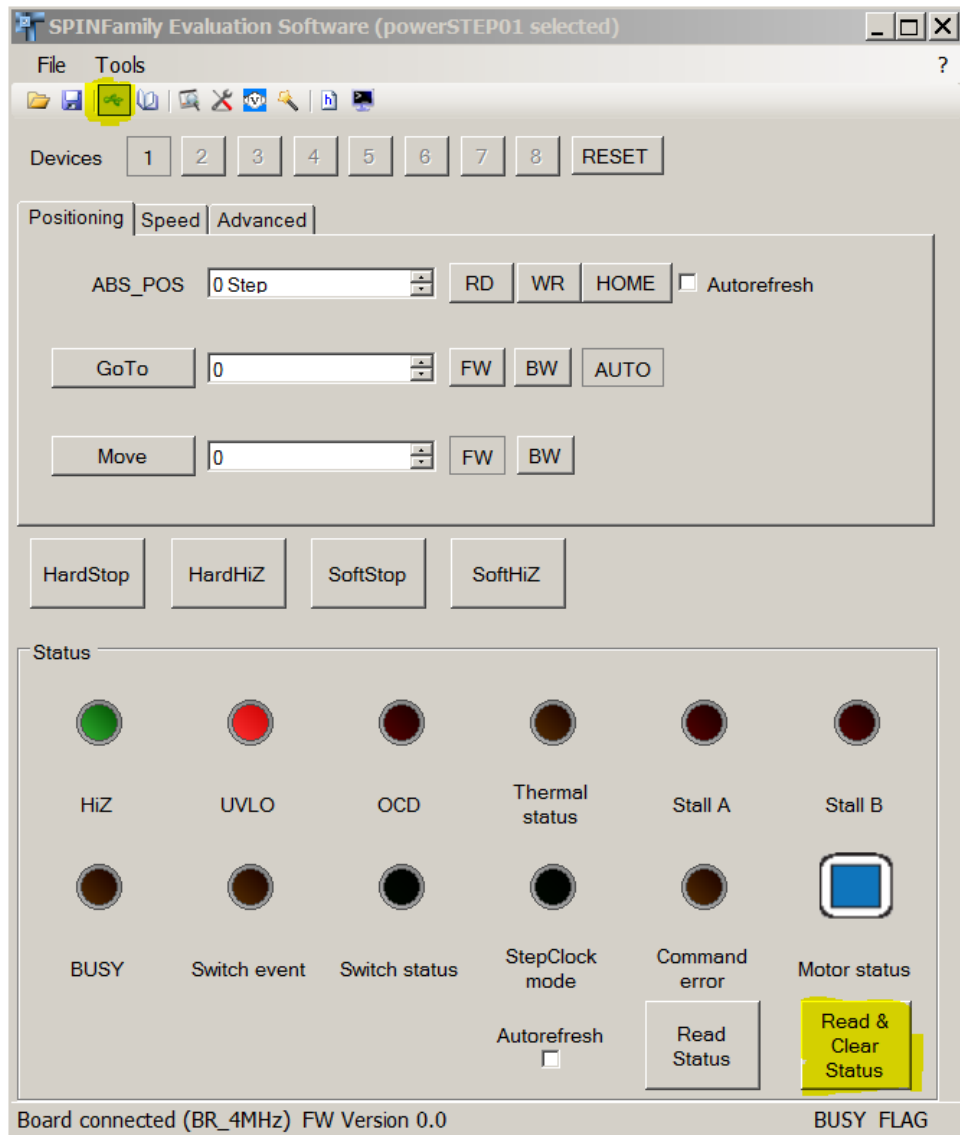


Figure 3. GUI main control screen

For the most part, go with default settings but some must be changed in order to arrive at a configuration that will work with the great majority of stepper motors. Click the “device configuration” icon (figure 4, upper left, highlighted).

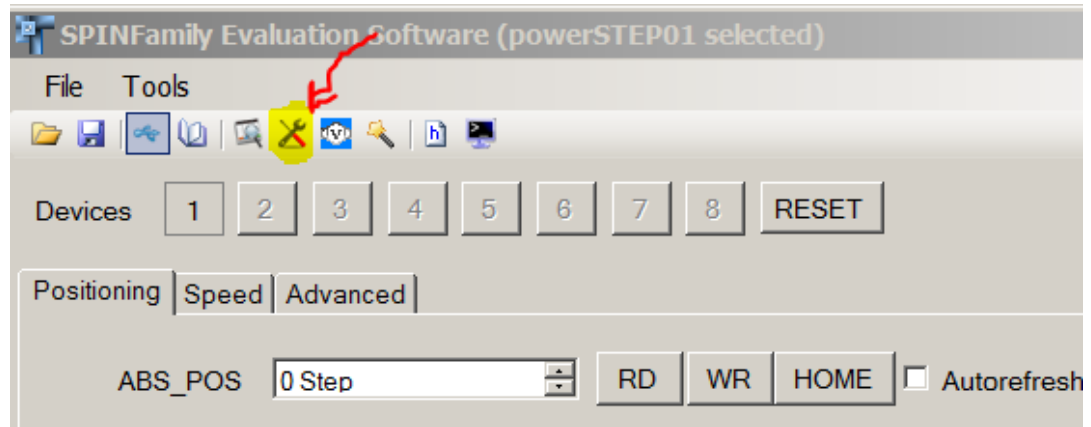


Figure 4. Selecting the device configuration

This will take you to the “device configuration” screen as shown in figure 5. Now click on the “gate driving” tab, make the settings as shown, and click “apply”.

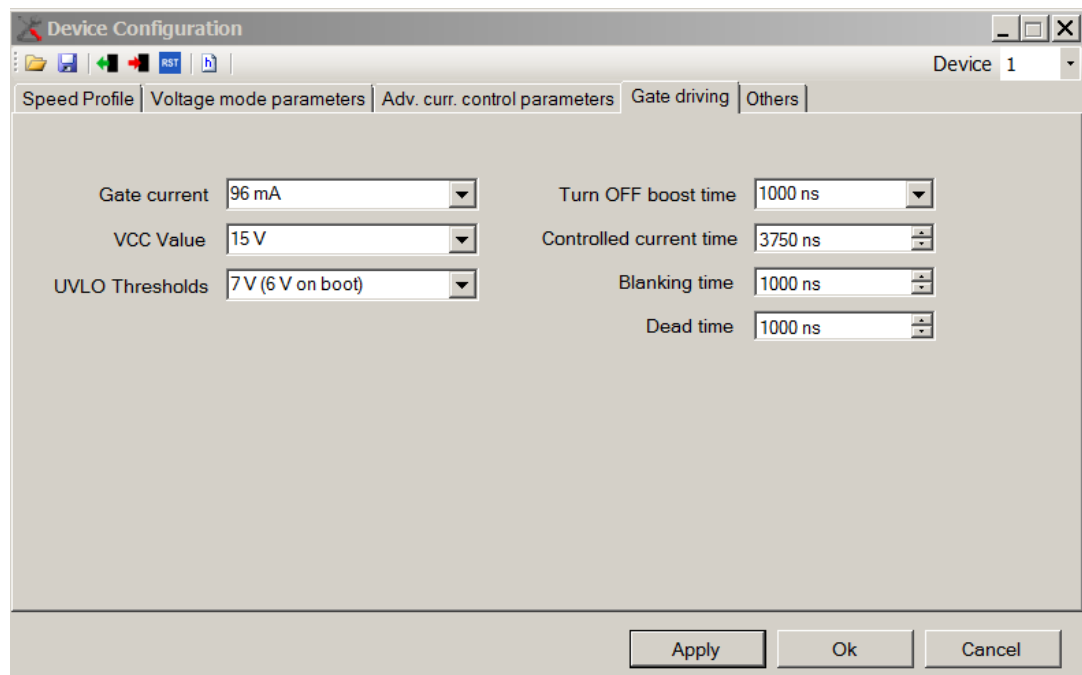


Figure 5. Gate Drive setting in GUI

Now click the “others” tab. As shown in figure 6, the only change needed here is to select “Adv. Current control” as highlighted. Make the selection and click the “apply” tab.

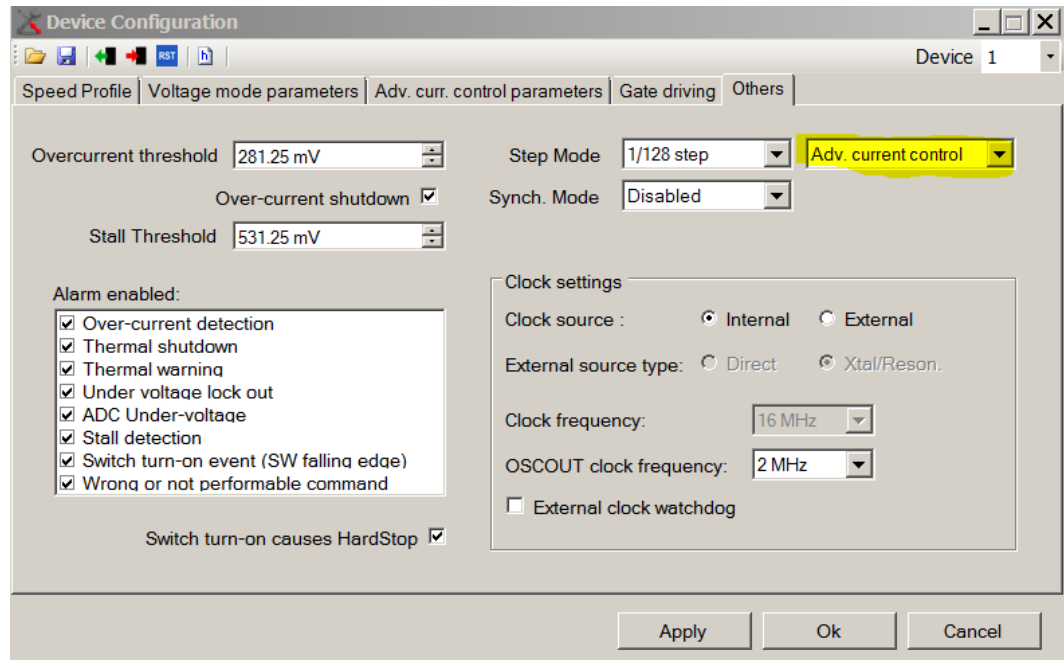


Figure 6. Selecting Advance Current Control in GUI

Now click the “Adv. Curr. Control parameters” tab. Change all of the highlighted settings as indicated in figure 7. Since the shunt resistance of the eval board is 33.3 milliohms, a shunt voltage set point of 33.33 millivolts would command a peak sinusoidal coil current of exactly 1.0 amp. Due to digital resolution limitations, 31.25 mV is the closest we can pick and this will give us very close to 1 amp peak in the motor phase. This should be OK for most typical stepper motors. If this is too high for your motor (check the data sheet) or so low that you cannot get the torque you need, adjust these values accordingly. It is possible to select different levels of current during acceleration, run, deceleration, and hold, but at this point we choose to keep it simple. When you have the changes made, click the “OK” icon.

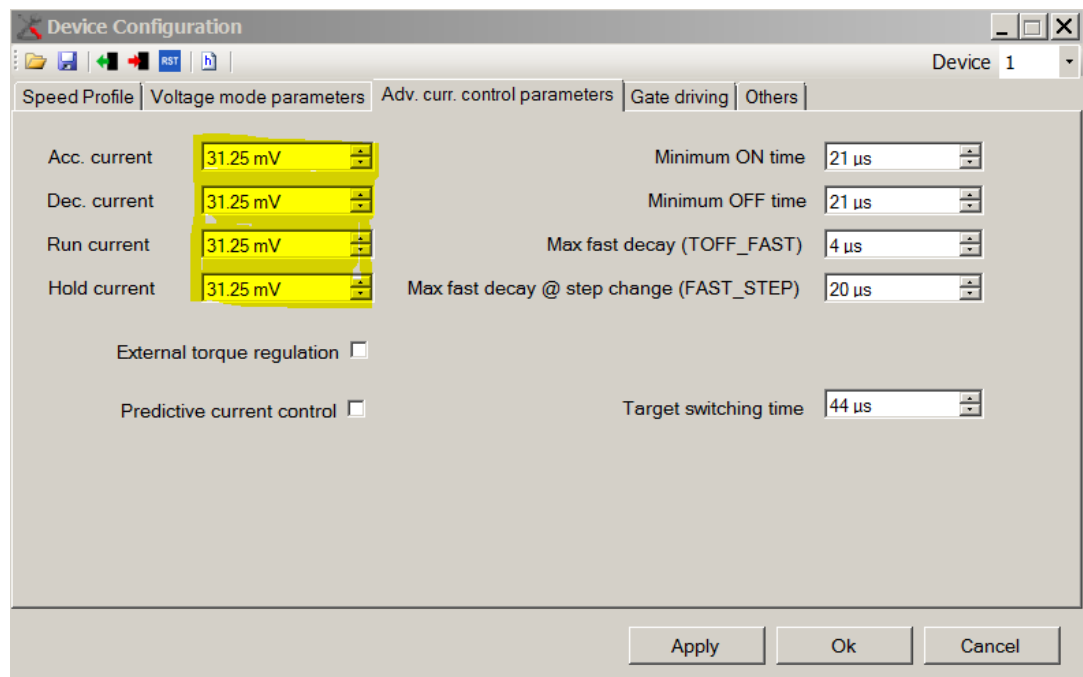


Figure 7. Setting the current level in the GUI

This will take us back to the main control screen, as presented in figure 8. Now select the “speed” tab and enter a running speed in full steps per second (this speed is always expressed in full steps per second, regardless of the microstepping resolution that has been selected). Now click the “run” icon. If all has gone according to plan, the motor will be spinning at constant speed (in this case, 222 full steps per second) and the motor current will look like the scope plot presented in figure 9. To stop the motor, use one of the four STOP icons. The “HiZ” icons will completely disable the output bridge (zero motor current) whereas the others will stop but maintain a holding current to hold position against any load torque.

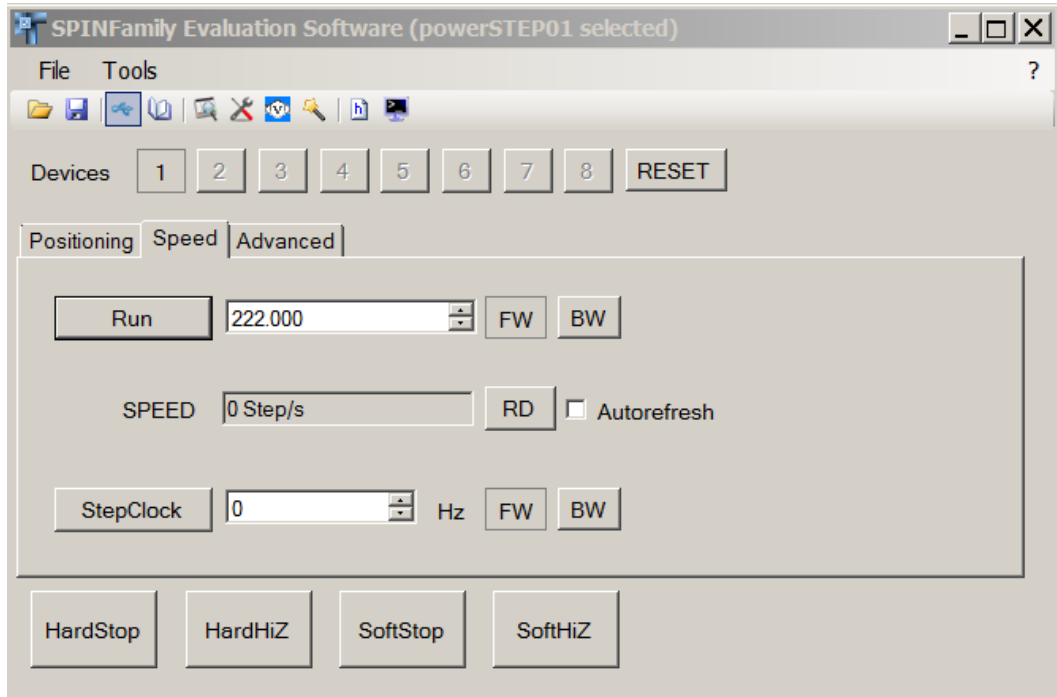


Figure 8. Running the motor from the GUI

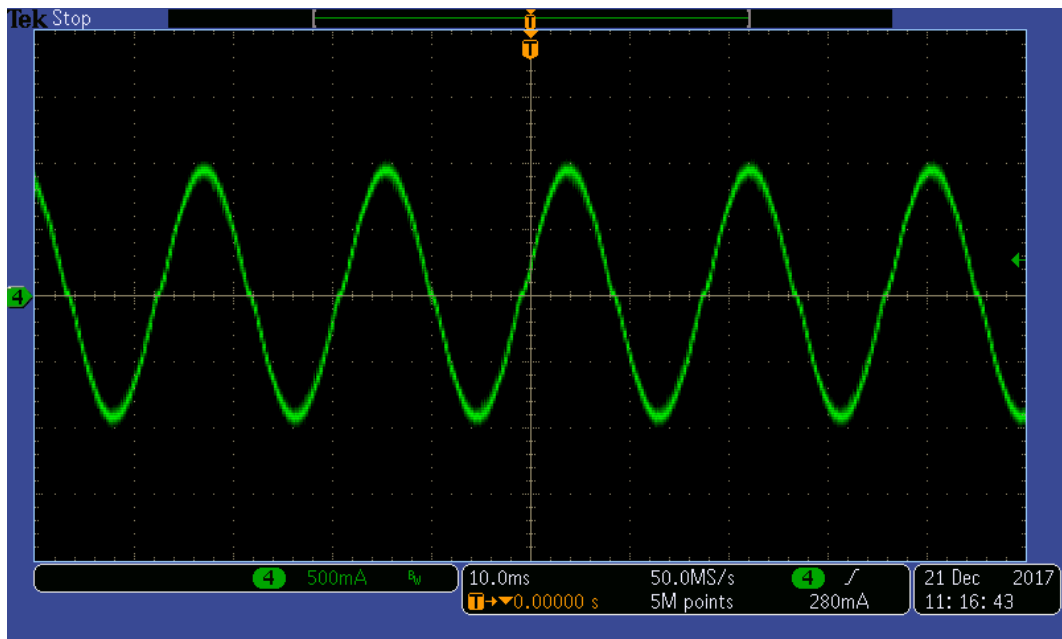


Figure 9. ... Typical motor current waveform

CONCLUSION

Now is the time to experiment. Run at different speeds. Forward (FW) and backward (BW). You can also select the positioning tab on the main control screen to make either absolute or incremental moved.

Support material

List any related support material such as evaluation boards, Gerber files etc. and any documents which might be useful to the customer, for example the datasheets, the evaluation board user manual etc.

Related design support material	
STEVAL-PCC009V2	IBU Motor Control & IPS universal interface
STSW-SPIN002	Evaluation software with graphical user interface for STSPIN motor driver ICs
Documentation	
Datasheet, powerSTEP01, System-in-package integrating microstepping controller and 10 A power MOSFETs	
Datasheet, EVLPOWERSTEP01, System-in-package integrating microstepping controller and 10 A power MOSFETs evaluation board	
Application Note, AN4290: L647x, L648x and powerSTEP01 family communication protocol	
Application Note, AN4158: Peak current control with automatic decay adjustment and predictive current control: basics and setup	

Revision history

Date	Version	Changes
29-Nov-2018	1	Initial release

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