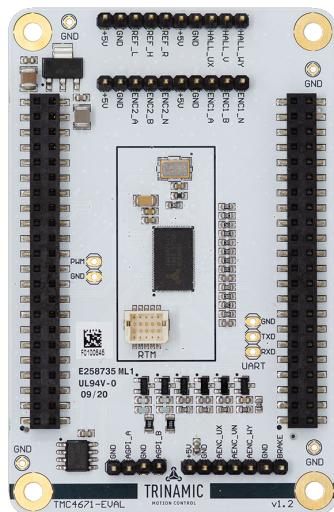


TMC4671-EVAL Evaluation Board

Document Revision V1.1 • 2020-APR-02

The TMC4671-EVAL is designed for evaluating all features of the TMC4671-LA. The evaluation board is part of TRINAMIC's user-friendly plug-in system for chip evaluation. Just connect the TMC4671-EVAL with Landungsbrücke, the associated base board and a separate Power Stage (e.g. TMC-UPS-10A/70V) for easy configuration of PI controllers and feedback systems as well as driving a motor in standard modes like position, velocity or torque mode.

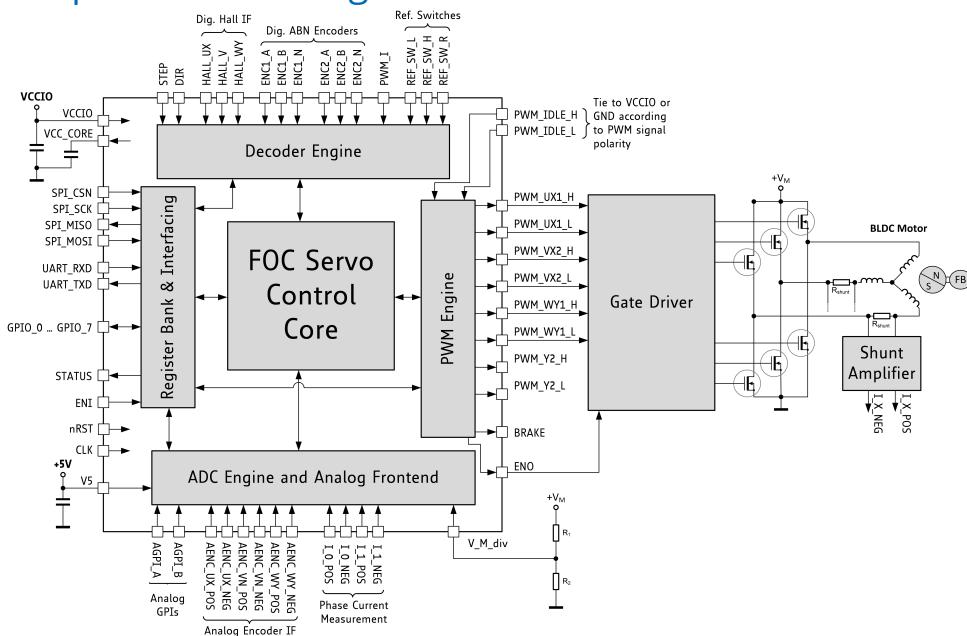


Applications

- Laboratory Automation
- Manufacturing
- Semiconductor Handling
- Robotics
- Factory Automation
- Test & Measurement

- Life Science
- Biotechnology
- Liquid Handling

Simplified Block Diagram



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Contents

1 Getting Started	3
1.1 First Start-Up	4
2 Hardware Information	5
3 Evaluation Features in the TMCL-IDE	6
4 Revision History	8
4.1 Document Revision	8



1 Getting Started

You need

- TMC4671-EVAL
 - Landungsbruecke or Startrampe with latest firmware (We recommend the Landungsbruecke as it offers faster USB communication.)
 - 2 x Eselsbruecke
 - TMC-UPS-2/24-EVAL or TMC-UPS-10A/70V-EVAL
 - BLDC or Stepper motor with supported feedback system
 - USB interface
 - Power Supply
 - Latest TMCL-IDE V3.0 and PC
 - Cables for interface, motors and power

Precautions

- Do not mix up connections or short-circuit pins.
 - Avoid bounding I/O wires with motor wires.
 - Do not exceed the maximum rated supply supply voltage!
 - Do not connect or disconnect the motor while powered!
 - START WITH POWER SUPPLY OFF!

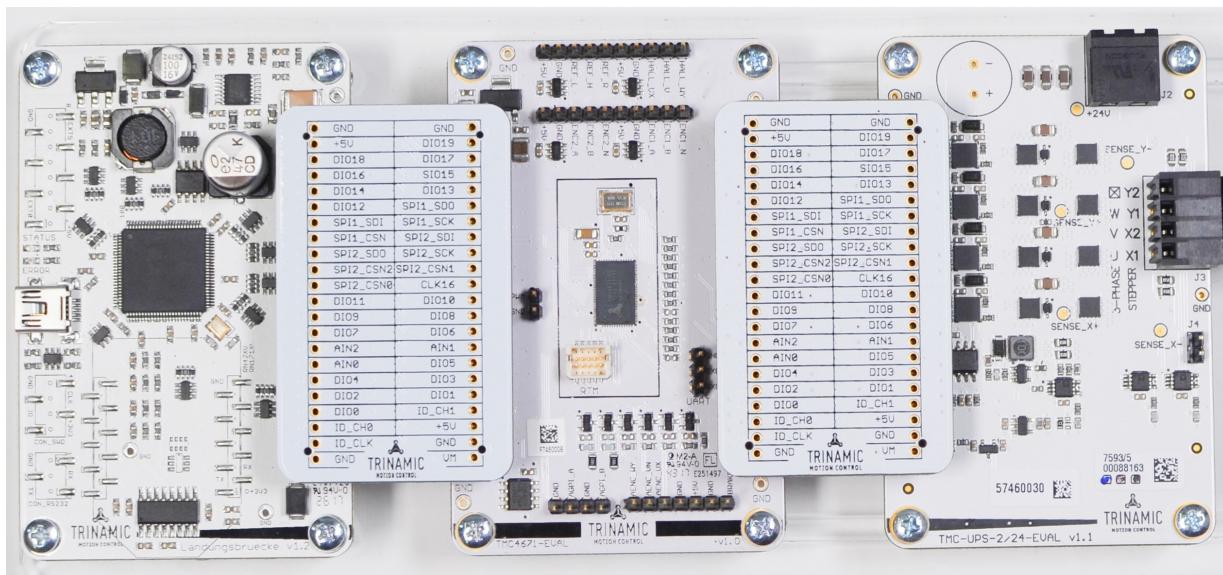


Figure 1: Getting started

NOTICE

The Landungsbruecke operates on USB Power Supply. All other voltages are generated from V_M. Kit works only, when V_M is applied.



1.1 First Start-Up

1. Make sure that the latest version of the TMCL-IDE is installed. The TMCL-IDE can be downloaded from www.trinamic.com/support/software/tmcl-ide/.
2. Open the TMCL-IDE and connect the Landungsbruecke or Startrampe via USB to the computer. For Windows 8 and higher no driver is needed, on Windows 7 machines the TMCL-IDE is installing the driver automatically.
3. Verify that the Landungsbruecke or Startrampe is using the latest firmware version. The firmware version is shown in the connected device tree.

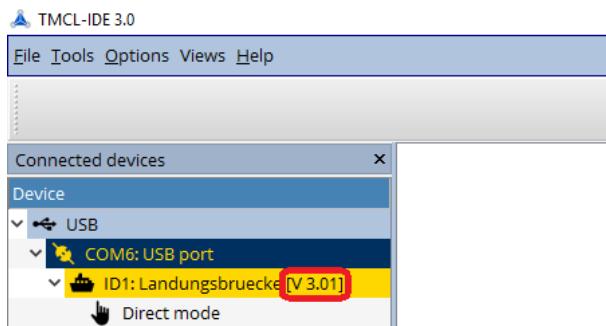


Figure 2: Firmware Version

4. The TMCL-IDE 3.0 needs room to show all important information and to provide a good overview. Therefore, arrange the main window related to your needs. We recommend using full screen. For evaluation boards it is essential to have access to the registers. Therefore open up the Register Browser (left side). For a better view click top right on the normal icon to get a maximized register browser window.
5. The TMCL-IDE includes a dialogue for diagnostic tasks. Further, the dialogue provides an overview of the connected motion controller and driver chips. Thus, a window pops up immediately after connecting the evaluation kit the first time. The window shows the actual status of the connections. The second tab of the dialogue offers the possibility to choose basic settings or to reset the module to factory defaults.

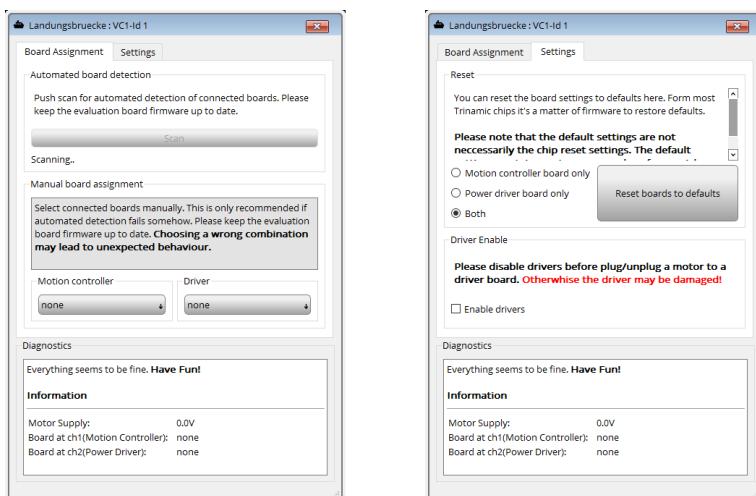


Figure 3: Landungsbruecke Dialogue



6. In the upper area of the Evaluation board you find pin headers for connecting Digital Encoders, Digital Hall Signals and Reference Switches. These input pins are 5V tolerant and have extra protection and conditioning circuitry. Analog Hall Sensor Signals or Sine/Cosine Encoder can be processed as single ended analog signals at the respective pin headers in the lower area of the PCB. Power Supply and GND pins allow easy connection. Please check board schematics for proper connection of your feedback system.

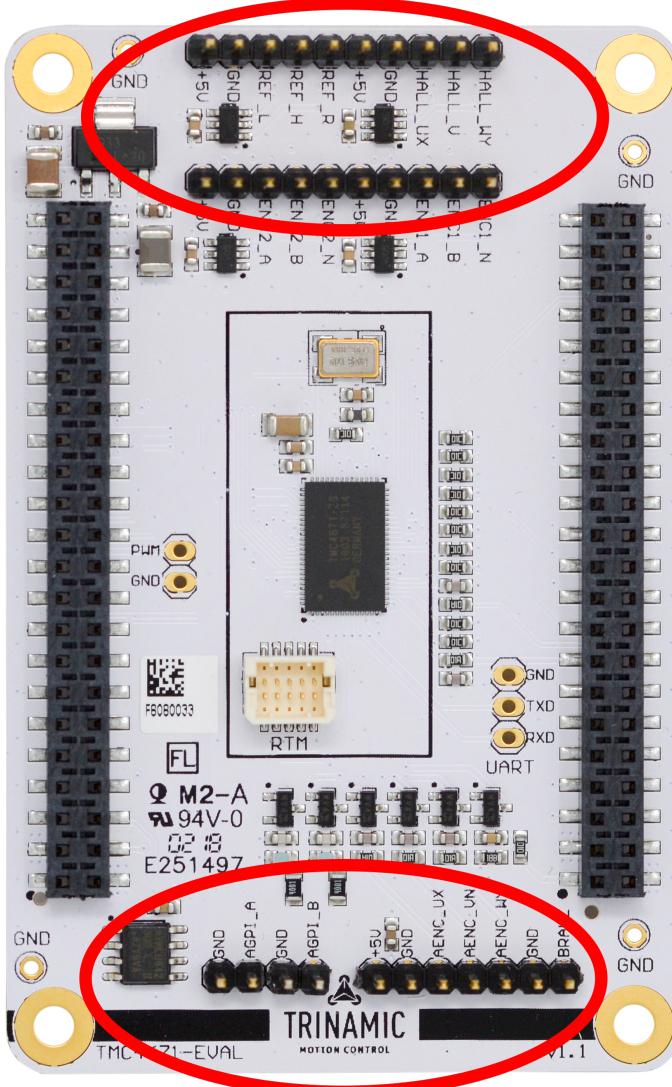


Figure 4: Pin Headers on TMC4671-EVAL

2 Hardware Information

All design files for our evaluation boards are available for free. We offer the original ECAD files, Gerber data, the BOM, and PDF copies. Typically, the ECAD files are in KiCAD format. Some (older) evaluation boards may only be available in Eagle, Altium, or PADS format.



Please check schematics for Jumper settings and input/output connector description.

The files can be downloaded from the evaluation boards' website directly at <https://www.trinamic.com/support/eval-kits/>.

Note If files are missing on the website or something is wrong please send us a note.

3 Evaluation Features in the TMCL-IDE

This chapter gives some hints and tips on using the functionality of the TMCL-IDE, e.g. how to use the velocity mode or using the wizards. The register browser can be used to access every register of the TMC4671.

Start first parametrization of the TMC4671-EVAL with the Wizard, providing guided dialogues to configure and calibrate your setup. Use configuration dialogues to setup PWM, Openloop generator, ADC calibration, and feedback configuration. You can start the Wizard by clicking the marked icon (see fig. 5).

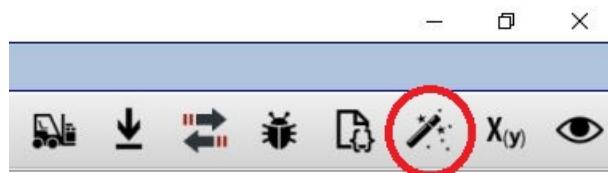


Figure 5: Wizard Icon in TMCL-IDE

The TMCL-IDE also offers special dialogues for selectors, limits and PI controller configuration accessible from the left control pane.

Adr	Name	Value
0x52	PHI_E_SELECTION	reserved
0x50	VELOCITY_SELECTION	phi_e selected via PHI_E_SELECTION
0x51	POSITION_SELECTION	phi_e selected via PHI_E_SELECTION
0x63	MODE_MOTION	stopped_mode
0x63	MODE_RAMP	no velocity ramping
0x0A	ADC_I0_SELECT	ADC_I0_RAW (analog input ADC_I_U)
0x0A	ADC_I1_SELECT	ADC_I0_RAW (analog input ADC_I_U)
0x0A	ADC_I_UX_SELECT	UX = ADC_I0 (default)
0x0A	ADC_I_V_SELECT	V = ADC_I0
0x0A	ADC_I_WY_SELECT	WY = ADC_I0

Adr	Name	Value
0x5C	PID_TORQUE_FLUX_TARGET_DDT_LIMITS	1 (1/ μ s)
0x5D	PIDOUT_UQ_UD_LIMITS	0
0x5E	PID_TORQUE_FLUX_LIMITS	0
0x5F	PID_ACCELERATION_LIMIT	0
0x60	PID_VELOCITY_LIMIT	0
0x61	PID_POSITION_LIMIT_LOW	0
0x62	PID_POSITION_LIMIT_HIGH	0

Figure 6: Selectors and Limits dialogues in TMCL-IDE



The TMCL-IDE also provides ease-of-use dialogues for using drive modes (Torque Mode, Velocity Mode and Position Mode, see fig. 7).

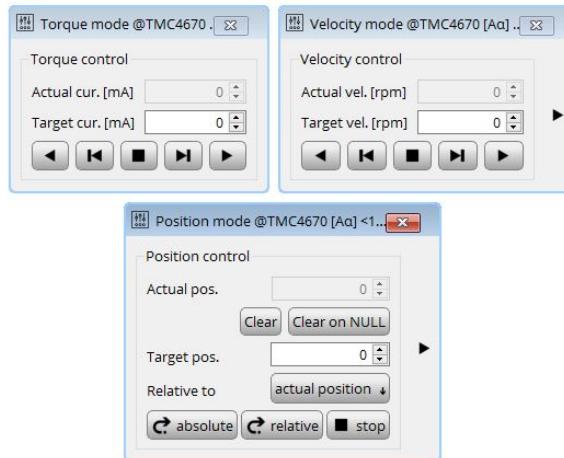


Figure 7: Control Mode Dialogues



4 Revision History

4.1 Document Revision

Version	Date	Author	Description
1.0	2018-MAY-03	OM	Initial creation.
1.1	2020-APR-02	OM	Update for TMC4671-LA.

Table 1: Document Revision

