TMC4670-EVAL Evaluation Kit

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The TMC4670-EVAL is designed for evaluating all features of the TMC4670-BI. The evaluation board is part of TRINAMICs user-friendly plug-in system for chip evaluation. Just connect the TMC4670-EVAL with Landungsbruecke, 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
- Robotics
- Manufacturing
- Semiconductor Handling
- Eactory Autom;
- Factory Automation
- Test & Measurement

Features

- Servo Controller for BLDC and stepper motors
- Control of torque (FOC), velocity and position by cascade control
- Integrated 12 bit ADCs
- Supply Voltages (1.2V, 2.5V, and 3.3V) are generated from 5V Supply
- SPI for communication with microcontroller
- ABN Encoder Interface, Digital Hall Interface, Analog Hall Interface, Sine/-Cosine Encoder and Ref.-Switch Input
 - Life Science
 - Biotechnology
 - Liquid Handling



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1 Getting Started

You need

- TMC4670-EVAL
- Landungsbruecke or Startrampe with latest firmware (We recommend the Landungsbruecke as it offers faster USB communication.)
- 2 x Eselsbruecke
- 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.

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1.1 First Start-Up

- 1. Make sure that the latest version of the TMCL-IDE 3.0 is installed. The TMCL-IDE can be downloaded from www.trinamic.com/support/software/tmcl-ide/.
- Open the TMCL-IDE and connect the Landungsbruecke or Startrampe via USB to the computer. For Windows 8 and higher is no driver 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.

🚴 TMCL-IDE 3.0	
<u>File Tools Options Views H</u> elp	
Connected devices ×	
Device	
✓ ↔ USB	
🗸 🏹 COM6: USB port	
💙 🌰 ID1: Landungsbruecke [V 3.01]	
🕛 Direct mode	

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 1defaults.

candongsbruecke : vc1-id i	Landungsbruecke : VC1-Id 1
Board Assignment Settings	Board Assignment Settings
Automated board detection	Reset
Push scan for automated detection of connected boards. Please keep the evaluation board firmware up to date.	You can reset the board settings to defaults here. Form most Trinamic chips it's a matter of firmware to restore defaults.
Scan	Please note that the default settings are not neccessarily the chip reset settings. The default
Scottining.	O Motion controller board only
Manual board assignment	O Power driver board only Reset boards to defaults
Select connected boards manually. This is only recommended if	Both
automated detection rails somenow. Please keep the evaluation board firmware up to date. Choosing a wrong combination may lead to unexpected behaviour.	Driver Enable
Motion controller Driver	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged!
Motion controller Driver none •	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged!
Motion controller Driver none o Driver	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged!
Motion controller Driver none Diagnostics Everything seems to be fine. Have Funt	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged! Enable drivers Diagnostics Everything seems to be fine. Have Funt
Motion controller Driver none Jagnostics Everything seems to be fine. Have Funt Information	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged! Enable drivers Diagnostics Everything seems to be fine. Have Funt Information
Motion controller none Driver none Diagnostics Everyching seems to be fine. Have Funl Information Motor Supply: 0.0V	Please disable drivers before plug/unplug a motor to a driver board. Otherwise the driver may be damaged! Enable drivers Diagnostics Everything seems to be fine. Have Funt Information Motor Supply: 0.0V
Motion controller none o Regnostics Everything seems to be fine. Have Funt Information Motor Supply: 0.0V Board atch (Motion Controllet): none	Please disable drivers before plug/unplug a motor to a driver board. Otherwhise the driver may be damaged! Enable drivers Diagnostics Everything seems to be fine. Have Funt Information Motor Supply: 0.0V Board at cht(Motion Controller): none

Figure 3: Landungsbruecke Dialogue

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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 needed 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 row. Power Supply and GND pins allow easy connection. Please check board schematics for proper connection of your feedback system. SSI and Step/Dir Interface are not supported yet.



Figure 4: Pin Header on TMC4670-EVAL

2 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.

Start first parametrization of the TMC4670-EVALwith 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.

🔢 Selectors @TMC4670 [Aα] <1st motor of 1> (Landungsbruecke) : COM9-Id 1					
Selectors					
Adr	Name Value				
0x52	2 PHI_E_SELECTION reserved		+		
0x50	50 VELOCITY_SELECTION phi_e selected via PHI_E				
0x51 POSITION_SELECTION phi_e		phi_e selected via PHI_E_SELE	phi_e selected via PHI_E_SELECTION 。		
	MODE_MOTION	stopped_mode	•		
0X63	MODE_RAMP	no velocity ramping	+		
	ADC_I0_SELECT	ADC_I0_RAW (analog input AD	C_I_U) ↓		
	ADC_I1_SELECT	ADC_10_RAW (analog input AD	C_I_U) +		
0x0A	ADC_I_UX_SELECT	UX = ADC_I0 (default)	•		
	ADC_I_V_SELECT	V = ADC_10	•		
	ADC_I_WY_SELECT	WY = ADC_10	•		
🔛 Limit	s @TMC4670 [Aα] <1st motor of 1> (Landungsbrue	cke) : COM9-Id 1	23		
Limits					
Adr	Name		Value		
0x5C	PID_TORQUE_FLUX_TARGET_DDT_LIMITS				
0x5D	PIDOUT_UQ_UD_LIMITS				
0x5E	PID_TORQUE_FLUX_LIMITS				
0x5F	PID_ACCELERATION_LIMIT				
0x60	PID_VELOCITY_LIMIT				
0x61	PID_POSITION_LIMIT_LOW 0				
0x62	62 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).

Torque mode @TMC4670 . 🖂	🔛 Velocity mode @TMC4670 [Aa] . 🖂
Torque control	Velocity control
Actual cur. [mA]	Actual vel. [rpm] 0
Target cur. [mA]	Target vel. [rpm] 0 🗘 🕨
Position mode @1	ΓΜC4670 [Aα] <1
Position control	
Actual pos.	0 🛊
Clea	Clear on NULL
Target pos.	0 🔹 🕨
Relative to	actual position 🔸
C absolute C	relative stop

Figure 7: Control Mode Dialogues





3 Revision History

3.1 Document Revision

Version	Date	Author	Description
1.0	2017-OCT-26	ОМ	Initial creation.

Table 1: Document Revision



X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Power Management IC Development Tools category:

Click to view products by Trinamic manufacturer:

Other Similar products are found below :

EVAL6482H-DISC EVAL-AD5522EBUZ EVAL-ADM1060EBZ EVAL-ADM1073MEBZ EVAL-ADM1166TQEBZ EVAL-ADM1168LQEBZ EVAL-ADM1171EBZ EVAL-ADM1276EBZ EVB-EN5319QI EVB-EN5365QI EVB-EN6347QI EVB-EP5348UI MIC23158YML EV MIC23451-AAAYFL EV MIC5281YMME EV 124352-HMC860LP3E ADM00513 ADM8611-EVALZ ADM8612-EVALZ ADM8613-EVALZ ADP1046ADC1-EVALZ ADP1055-EVALZ ADP122-3.3-EVALZ ADP130-0.8-EVALZ ADP130-1.2-EVALZ ADP130-1.5-EVALZ ADP1046ADC1-EVALZ ADP100UJZ-REDYKIT ADP166UJ-EVALZ ADP1712-3.3-EVALZ ADP1714-3.3-EVALZ ADP130-1.5-EVALZ ADP130-1.8-EVALZ ADP160UJZ-REDYKIT ADP166UJ-EVALZ ADP1712-3.3-EVALZ ADP1714-3.3-EVALZ ADP1715-3.3-EVALZ ADP1716-2.5-EVALZ ADP1740-1.5-EVALZ ADP1752-1.5-EVALZ ADP1754-1.5-EVALZ ADP1828LC-EVALZ ADP1870-0.3-EVALZ ADP1871-0.6-EVALZ ADP1873-0.6-EVALZ ADP1874-0.3-EVALZ ADP1876-EVALZ ADP1879-1.0-EVALZ ADP1882-1.0-EVALZ ADP1883-0.6-EVALZ ADP197CB-EVALZ ADP199CB-EVALZ ADP2102-1.25-EVALZ ADP2102-1.2-EVALZ ADP2102-1.875EVALZ