TMC7300-EVAL Evaluation Board

Document Revision V1.0 • 2019-NOV-28

The TMC7300-EVAL allows evaluation of the TMC7300-LA low voltage DC motor driver in combination with the TRINAMIC evaluation board system, or as stand-alone-board. It uses the standard schematic and offers several options in order to test different modes of operation.



Features

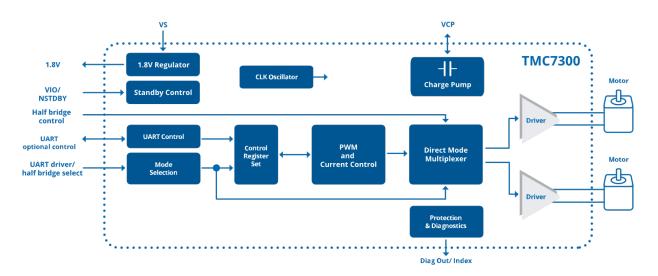
- 2 DC motors with up to 2A current
- **Single DC motor** with up to 2.4A current
- **Supply Voltage** 2V (1.8V)...11V DC
- Standby < 50nA typical current draw
 UART for advanced configuration
- and control
- Parallel operation for single DC motor
- Motor load feedback
- Full protection and diagnostics

Applications

- IoT & Handheld devices
- Battery operated equipment
- Printers, POS

- Miniature 3D Printers
- Toys
- Office and home automation
- CCTV, Security
- HVAC
- Mobile medical devices

Simplified Block Diagram



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1 Getting Started

You need

- TMC7300-EVAL
- Landungsbruecke with latest firmware. (The Startrampe does not support the UART interface.)
- Eselsbruecke bridge board
- 1 or 2 DC motors
- 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 bundling I/O wires with motor wires.
- Do not exceed the maximum rated supply voltage!
- Do not connect or disconnect the motor while powered!
- START WITH POWER SUPPLY OFF!

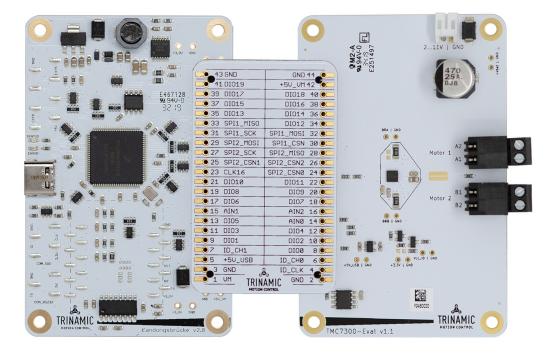


Figure 1: Getting started



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 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 is using the latest firmware version. The firmware version is shown in the connected device tree.

The latest official firmware releases are available from Trinamic's website. Incremental updates (nightly builds) are available from Trinamic's public GitHub repositories.

👗 TMCL-IDE 3.0						
<u>F</u> ile <u>T</u> ools <u>O</u> ptions Views <u>H</u> elp						
1						
Connected devices ×						
Device						
✓ 🐳 USB						
🗸 🏹 COM6: USB port						
👻 🌰 ID1: Landungsbruecke [V 3.01]						
birect 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. 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.

Landungsbruecke : '	VC1-Id 1			×	📥 Landungsbruecke	: VC1-Id 1		
oard Assignment	Settings				Board Assignment	Settings		
Automated board o	letection			_	Reset			
Push scan for auto keep the evaluatio			oards. Please				gs to defaults here. Form r irmware to restore defaul	
	Sca	٦	_				It settings are not settings. The default	
Scanning				- 11	O Motion contro	ller board only	y	
Manual board assig	nment					oard only	Reset boards to de	faults
					O Power driver b			
Select connected b					Power driver b Both			
Select connected b automated detect board firmware up may lead to une	ion fails somen to date. Choo	ow. Please keep t sing a wrong o	he evaluation					
automated detect board firmware up	ion fails someho to date. Choo xpected beha	ow. Please keep t sing a wrong o	he evaluation		Both Driver Enable Please disable	drivers befo	re plug/unplug a moto he driver may be dam	
automated detect board firmware up may lead to une	ion fails someho to date. Choo xpected beha	ow. Please keep t sing a wrong o wiour.	he evaluation		Both Driver Enable Please disable	drivers befo		
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automated detect board firmware up may lead to une -Motion controller none lagnostics everything seems to	ion fails somehi to date. Choo xpected beha to be fine. Have	w. Please keep t sing a wrong o viour. Driver none	he evaluation		Both Driver Enable Please disable driver board. C Enable drivers Diagnostics Everything seems t	drivers befo	he driver may be dam	
automated detect board firmware up may lead to une Motion controller none lagnostics everything seems to nformation	ion fails somehi to date. Choo expected behi be fine. Have	wy. Please keep t sing a wrong o viour. Driver none Fun!	he evaluation		Both Driver Enable Please disable driver board. C Enable drivers Diagnostics Everything seems t Information	drivers befo therwhise t to be fine. Hav	he driver may be dam	

Figure 3: Landungsbruecke Dialogue



2 Hardware Information

All design files for our evaluation boards are available for free. We offer the original ECAD files (Eagle, Altium, or PADS), Gerber data, the BOM, and PDF copies. Please check schematics for Jumper settings and input/output connector description.

The files can be downloaded from the evaluation boards' website directly at out homepage: TRINAMIC Eval Kit homepage.

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.

Note In order to achieve good settings please refer to descriptions and flowcharts in the TMC7300-LA data sheet. The register browser of the TMCL-IDE provides helpful information about any currently selected parameter. Beyond that, the data sheet explains concepts and ideas which are essential for understanding how the registers are linked together and which setting will fit for which kind of application. For getting more familiar with the evaluation kit in the beginning of your examinations, drive the motor using velocity mode and/or positioning mode first. Beyond this, the direct mode function can be used. This way, TMCL commands can be sent to the evaluation board system.

3.1 Tree View and Control Tools

The TMCL-IDE offers a set of tools to control and interact with the TMC7300-EVAL. The tree view as shown below allows access to each of these tools. The enable button brings the TMC7300 into standby mode. The PWM tools allows to control the DC motors.

Connected devices ×
Device
Y 🗐 Serial
🍇 COM1: Serial port
Virtual
VC1: USB port
ID1: Landungsbruecke [virtual]
🖢 Direct mode
✓ DC power driver
TMC7300-EVAL
Register browser (TMC7300)
V 🕑 Motor 1
Ƴ Info graph
M Empty graph
Chip Click
Standby
₽WM

Figure 4: Tree view and tool set of a TMC7300-EVAL (similar for other ICs).



3.2 ChipClick

To configure the control pins for the TMC7300-EVAL, open the ChipClick tool by clicking the appropriate entry in the tool tree. To view a description of a pins possible configurations, hover the mouse over the pin in the graphical view. To change the pins state, click on it.

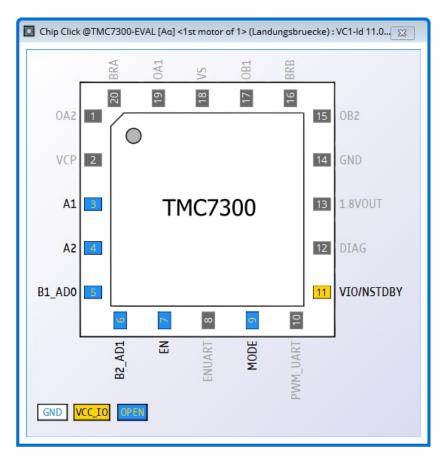


Figure 5: Configuring the control pins of a TMC7300 (similar for other ICs).

3.3 Register Browser

To interact with the internal registers of the TMC7300 you can open the register browser. This tool shows all available registers and their content (flags, parameters) in real-time. It allows for modifying each individual bit, flag or parameter inside the registers.



↓ e.g. vel ma	tch all names contains Name (set checked for auto		·]						Et ?	
		Name		ACS	Size/Mask	Read value	To write value		Description(s)	
0x000x7F	All registers	 Active registers])			
•	: 🗹 General Registers	V X GCONF	0x00	RW	32	0x00000000	0x00000000		 GCONF – Global configuration flags 	
Group select	: 🗹 Chopper Co Registers	PWM direct		RW	0000 0001	low	Set bit 0	0	This value has to bre enabling drive	
		extcap		RW	0000 0002	low	Set bit 1	OpeCP.	External capacitor	
		par mode		RW	0000 0004	low	Set bit 2	Opeors	Parallel mode	
		test_mode		RW	0000 0080	low	Set bit 7		test_mode	
		> 🗷 GSTAT	0x01	RWC	32	0x00000000	0x00000000		GSTAT – Global str respective flag	
		> 🗶 IFCNT	0x02	R	32	0x00000000				
		> SLAVECONF	0x03	W	32	0x00000000	0x00000000			
		> 🗶 IOIN	0x06	R	32	0x00000000			• INPUT (Reads theput pins availab	
		> 🗶 CURRENT_LIN	AIT 0x10	W	32	0x00000000	0x00000000		CURRENT_LIMITer current con	
		> 🗷 PWM_AB	0x22	W	32	0x00000000	0x00000000		 PWM_DIRECT - Driver current cont 	
		> 🗷 CHOPCONF	0x6C	RW	32	0x00000000	0x00000000		 CHOPCONF - Chopper configuration 	
		> 🗷 DRV_STATUS	0x6F	R	32	0x00000000				
		> 🗵 PWMCONF	0x70	RW	32	0x00000000	0x00000000		 PWMCONF - Volt PWM StealthCh 	
		XML-Version:1.0								
		Main description The TMC7300 (Minion) is an ultra-silent motor driver IC for two DC motors.								

Figure 6: Register browser of a TMC7300 (similar for other ICs).



4 Revision History

4.1 Document Revision

Version	Date	Author	Description
1.0	2019-NOV-28	SK	Initial release.

Table 1: Document Revision



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Trinamic: TMC7300-EVAL TMC7300-EVAL-KIT