

TEP0003 TRM

[Download PDF version of this document.](#)

Table of Contents

- [Overview](#)
 - [Key Features](#)
 - [Block Diagram](#)
 - [Main Components](#)
 - [Initial Delivery Stat](#)
 - [Configuration Signals](#)
- [Signals, Interfaces and Pins](#)
 - [Pmod Connectors](#)
 - [Terminal blocks](#)
- [On-board Peripherals](#)
 - [Analog to Digital Converters](#)
- [Power and Power-On Sequence](#)
 - [Power Supply](#)
 - [Power Consumption](#)
 - [Power Distribution Dependencies](#)
 - [Power-On Sequence](#)
 - [Power Rails](#)
- [Technical Specifications](#)
 - [Absolute Maximum Ratings](#)
 - [Recommended Operating Conditions](#)
 - [Physical Dimensions](#)
- [Currently Offered Variants](#)
- [Revision History](#)
 - [Hardware Revision History](#)
 - [Document Change History](#)
- [Disclaimer](#)
 - [Data Privacy](#)
 - [Document Warranty](#)
 - [Limitation of Liability](#)
 - [Copyright Notice](#)
 - [Technology Licenses](#)
 - [Environmental Protection](#)
 - [REACH, RoHS and WEEE](#)

Overview

The Trenz Electronic TEP0003 is is a BEMF (Back Electromagnetic Field) based drive. It can be used in many low cost drives where no low speed operation is needed.

Refer to <http://trenz.org/tep0003-info> for the current online version of this manual and other available documentation.

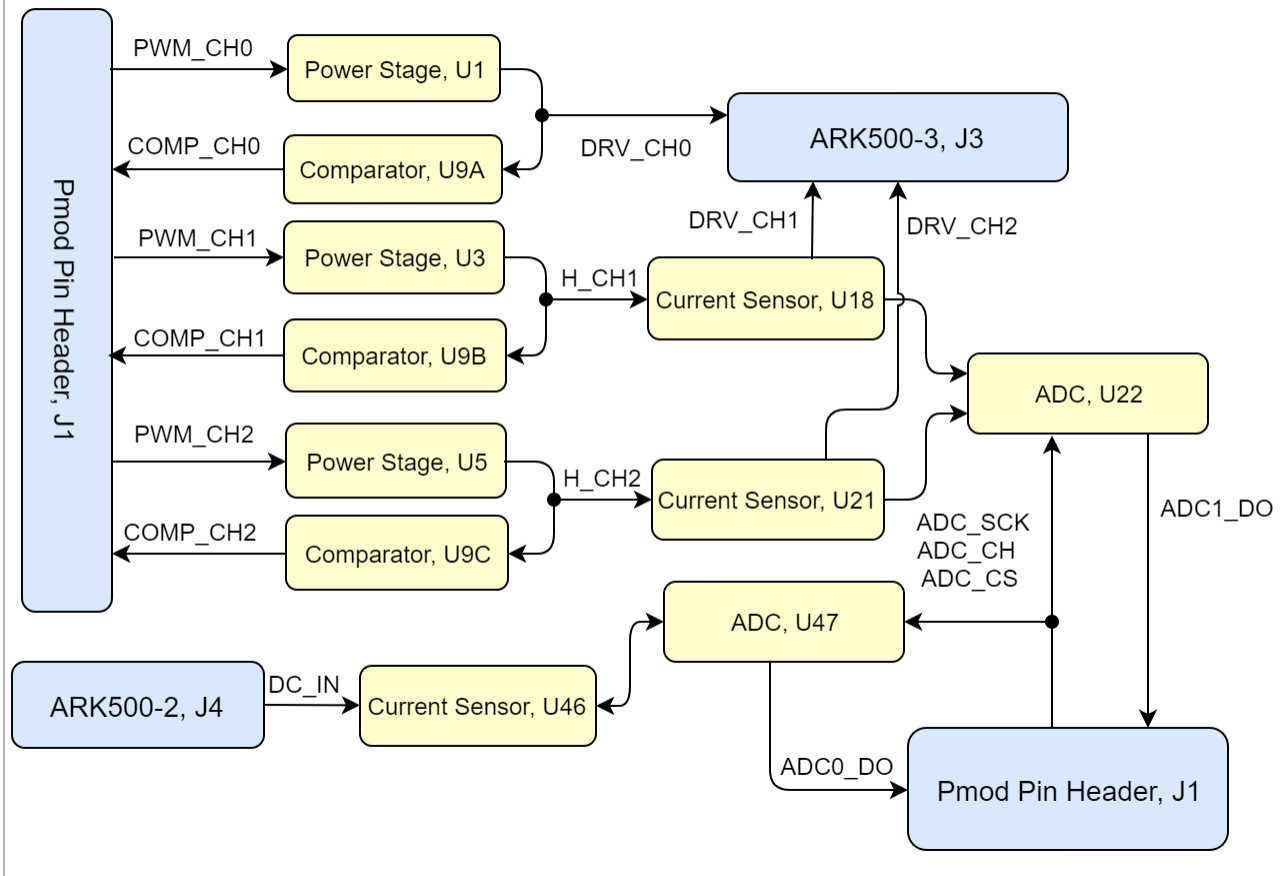
Key Features

- **Modules/ SoC FPGA**
 - Compatible with Digilent's Pmod interfaces
- **RAM/Storage**
- **On Board**
 - 2x A2D Converters
 - 3x Current Sensors
 - 6x Power Stages
- **Interface**
 - 2x Pmod Pin Headers (2x6 Pol)
- **Power**
 - 3.3V supply voltage from Pmods
- **Dimension**

◦ 40 mm x 40 mm

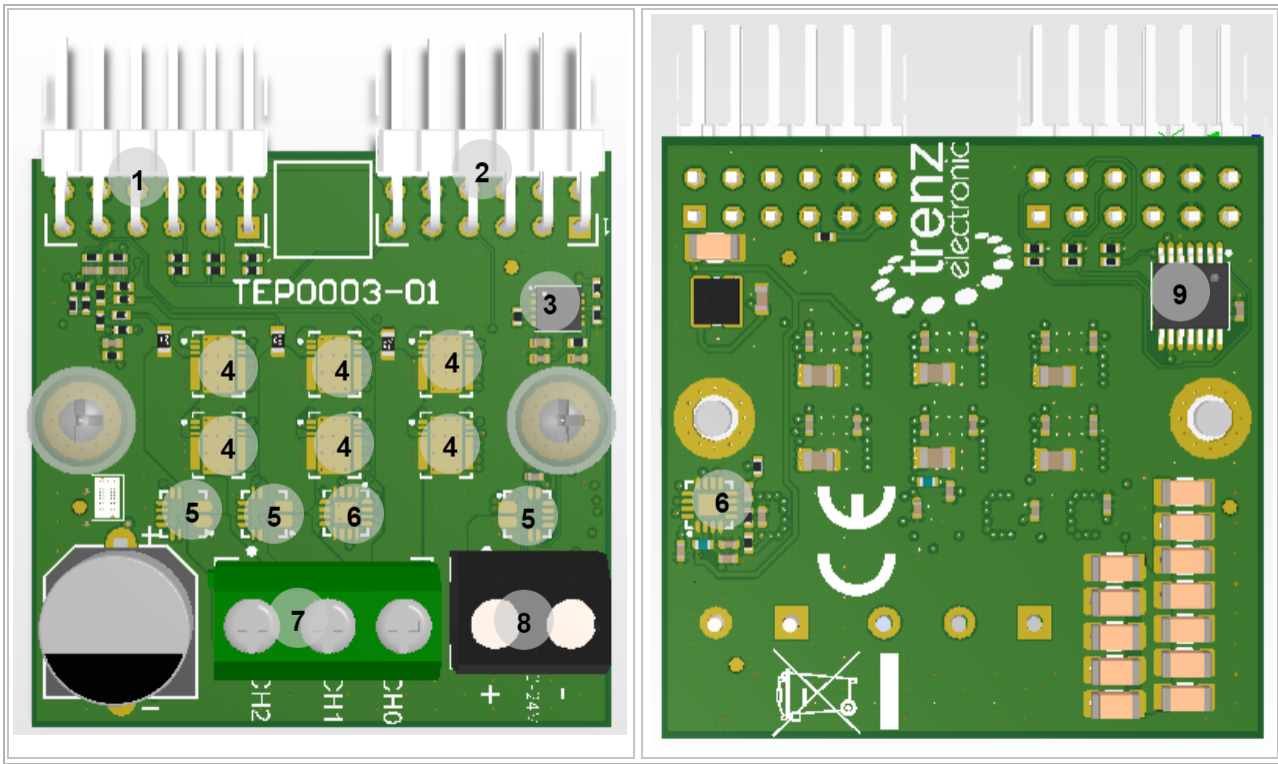
Block Diagram

TEP0003



TEP0003 block diagram

Main Components



TEP0003 main components

1. Pmod Pin Header, J1
2. Pmod Pin Header, J2
3. Synchronous DC/DC Converter, U7
4. Power Stages, U1...U6
5. Current Sensors, U18, U21, U46
6. ADC, U22, U47
7. Terminal Block, J3
8. Terminal Block, J4
9. Low-Power Push-Pull Output Comparator, U9

Initial Delivery Stat

Storage device name	Content	Notes
--	--	--

Initial delivery state of programmable devices on the module

Configuration Signals

Signals, Interfaces and Pins

Pmod Connectors

TEP0003 is equipped with two Pmod Connectors.

Pin	Schematic		Notes
	Pmod, J1	Pmod, J2	
1	PWM_CH0	ADC_CH	
2	PWM_CH1	ADC_SCK	
3	PWM_CH2	ADC_CS	
4	-	SENSOR_FAUL	
5	GND	GND	
6	3.3V	3.3V	
7	COMP_CH0	ADC0_DO	
8	COMP_CH1	ADC1_DO	
9	COMP_CH2	-	
10	-	-	
11	GND	GND	
12	3.3V	3.3V	

General PL I/O to B2B connectors information

Terminal blocks

The TEP0002 is equipped with two Terminal Blocks J3 and J4.

Designator	Pin	Schematic	Notes
J3	1	DRV_CH2	ARK500-3
	2	DRV_CH1	ARK500-3
	3	DRV_CH0	ARK500-3
J4	1	DC_IN	ARK500-2
	2	GND	ARK500-2

Terminal Blocks information

On-board Peripherals

Chip/Interface	Designator	Notes
ADC	U22, U47	

On board peripherals

Analog to Digital Converters

The TEP0003 has two ADCs, U22 and U47.

Pins	Connected to	

	ADC, U22	ADC, U47	Notes
AVDD	5V	5V	
REF	5V	5V	
AIN0+	U18 (VIOUT)	DC_IN	
AIN0-	GND	GND	
AIN1+	U21 (VIOUT)	U46 (VIOUT)	
AIN1-	GND	GND	
REFGND	GND	GND	
DVDD	3.3V	3.3V	
SCLK	ADC_SCK	ADC_SCK	Access via Pmod, J2
SDO	ADC1_DO	ADC0_DO	Access via Pmod, J2
CS	ADC_CS	ADC_CS	Access via Pmod, J2
CH_SEL	ADC_CH	ADC_CH	Access via Pmod, J2
PDEN	GND	GND	

Analog Digital Converter

Power and Power-On Sequence

Power Supply

TEP0003 will be power supplied through 3.3V from Pmods, J1 and J2.

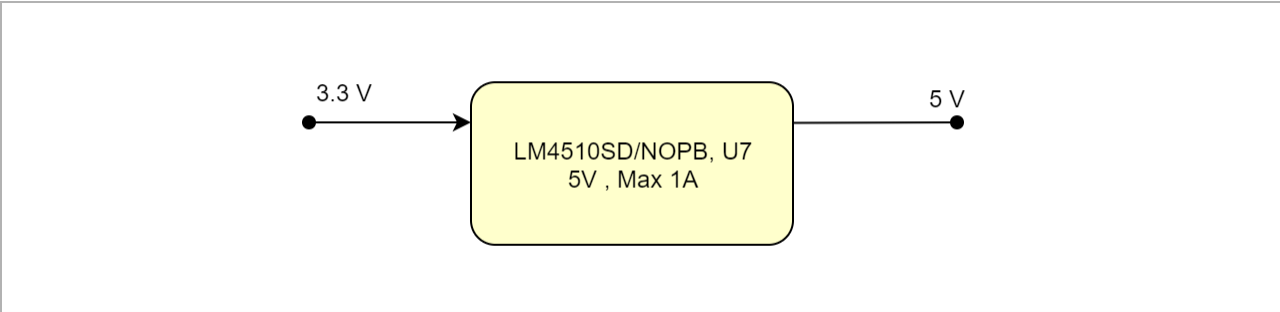
Power Consumption

Power Input Pin	Typical Current
3.3V	TBD*

Power Consumption

* TBD - To Be Determined

Power Distribution Dependencies



Power Distribution

Power-On Sequence

There is no specific power on sequence, after power on all electrical components will be enabled.

Power Rails

Power Rail Name	Pmod J1 Pin	Pmod J2 Pin	Notes
3.3V	6,12	6,12	

Module power rails.

Technical Specifications

Absolute Maximum Ratings

Symbols	Description	Min	Max	Unit
3.3V	Supply Voltage	-0.3	6.5	V
T_STG	Storage Temperature	-40	105	°C

PS absolute maximum ratings

Recommended Operating Conditions

Operating temperature range depends also on customer design and cooling solution. Please contact us for options.

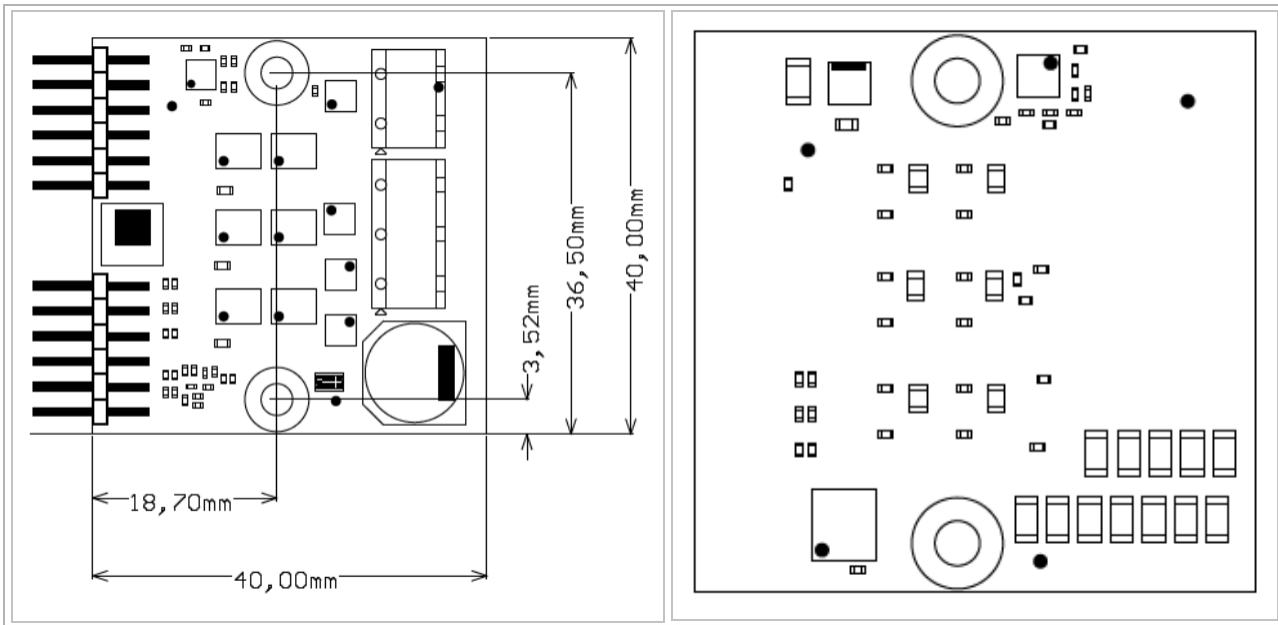
Parameter	Min	Max	Units	Reference Document
3.3V	3.0	4.2	V	Supplied from Pmod
T_OPR	-30	+105	°C	See ARK500-3 and ARK500-2 Datasheet

Recommended operating conditions.

Physical Dimensions

- Module size: 40 mm × 40 mm. Please download the assembly diagram for exact numbers.

PCB thickness: 1.6 mm.



Physical Dimension

Currently Offered Variants

Trenz shop TEP0003 overview page	
English page	German page

Trenz Electronic Shop Overview

Revision History

Hardware Revision History

Date	Revision	Changes	Documentation Link
2018-07-18	01	Initial Release	REV01

Hardware Revision History

Hardware revision number can be found on the PCB board together with the module model number separated by the dash.



Board hardware revision number.

Document Change History

Date	Revision	Contributor	Description
Error rendering macro 'page-info' Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	Error rendering macro 'page-info' Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	Error rendering macro 'page-info' Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	Initial Release

--	all	Error rendering macro 'page-info' Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]	• --
----	-----	---	------

Document change history.

Disclaimer

Data Privacy

Please also note our data protection declaration at <https://www.trenz-electronic.de/en/Data-protection-Privacy>

Document Warranty

The material contained in this document is provided "as is" and is subject to being changed at any time without notice. Trenz Electronic does not warrant the accuracy and completeness of the materials in this document. Further, to the maximum extent permitted by applicable law, Trenz Electronic disclaims all warranties, either express or implied, with regard to this document and any information contained herein, including but not limited to the implied warranties of merchantability, fitness for a particular purpose or non infringement of intellectual property. Trenz Electronic shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein.

Limitation of Liability

In no event will Trenz Electronic, its suppliers, or other third parties mentioned in this document be liable for any damages whatsoever (including, without limitation, those resulting from lost profits, lost data or business interruption) arising out of the use, inability to use, or the results of use of this document, any documents linked to this document, or the materials or information contained at any or all such documents. If your use of the materials or information from this document results in the need for servicing, repair or correction of equipment or data, you assume all costs thereof.

Copyright Notice

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Trenz Electronic.

Technology Licenses

The hardware / firmware / software described in this document are furnished under a license and may be used /modified / copied only in accordance with the terms of such license.

Environmental Protection

To confront directly with the responsibility toward the environment, the global community and eventually also oneself. Such a resolution should be integral part not only of everybody's life. Also enterprises shall be conscious of their social responsibility and contribute to the preservation of our common living space. That is why Trenz Electronic invests in the protection of our Environment.

REACH, RoHS and WEEE

REACH

Trenz Electronic is a manufacturer and a distributor of electronic products. It is therefore a so called downstream user in the sense of [REACH](#). The products we supply to you are solely non-chemical products (goods). Moreover and under normal and reasonably foreseeable circumstances of application, the goods supplied to you shall not release any substance. For that, Trenz Electronic is obliged to neither register nor to provide safety data sheet. According to present knowledge and to best of our knowledge, no [SVHC \(Substances of Very High Concern\) on the Candidate List](#) are contained in our products. Furthermore, we will immediately and unsolicited inform our customers in compliance with REACH - Article 33 if any substance present in our goods (above a concentration of 0,1 % weight by weight) will be classified as SVHC by the [European Chemicals Agency \(ECHA\)](#).

RoHS

Trenz Electronic GmbH herewith declares that all its products are developed, manufactured and distributed RoHS compliant.

WEEE

Information for users within the European Union in accordance with Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Users of electrical and electronic equipment in private households are required not to dispose of waste electrical and electronic equipment as unsorted municipal waste and to collect such waste electrical and electronic equipment separately. By the 13 August 2005, Member States shall have ensured that systems are set up allowing final holders and distributors to return waste electrical and electronic equipment at least free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities. Separate collection is the precondition to ensure specific treatment and recycling of waste electrical and electronic equipment and is necessary to achieve the chosen level of protection of human health and the environment in the European Union. Consumers have to actively contribute to the success of such collection and the return of waste electrical and electronic equipment. Presence of hazardous substances in electrical and electronic equipment results in potential effects on the environment and human health. The symbol consisting of the crossed-out wheeled bin indicates separate collection for waste electrical and electronic equipment.

Trenz Electronic is registered under WEEE-Reg.-Nr. DE97922676.

Ambiguous method overloading for method `jdk.proxy279.$Proxy4022#hasContentLevelPermission`. Cannot resolve which method to invoke for `[null, class java.lang.String, class com.atlassian.confluence.pages.Page]` due to overlapping prototypes between: `[interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]` `[interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]`