



TEI0003 Test Board

Revision v.5

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Online version of this document:

<https://wiki.trenz-electronic.de/display/PD/TEI0003+Test+Board>

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5 Overview

NIOS II Design with SDRAM Controller, 3-axis Accelerometer and 5 different LED sequences, that can be toggled using the user button.

Refer to <http://trenz.org/cyc1000-info> for the current online version of this manual and other available documentation.

5.1 Key Features

- Quartus 18.1
- NIOS II
- SPI
- UART
- EPCQ16(A) Flash memory
- SDRAM memory
- 3-axis Accelerometer
- User LEDs
- User buttons

5.2 Revision History

Date	Quartus	Project Built	Authors	Description
2019-11-11	18.1	TEI0003-test_board_noprebuilt-quartus_18.1-20191111104152.zip TEI0003-test_board-quartus_18.1-20191111104339.zip	Thomas Dück	<ul style="list-style-type: none"> • add bash files for Linux OS
2019-20-29	18.1	TEI0003-test_board_noprebuilt-quartus_18.1-20191029121432.zip TEI0003-test_board-quartus_18.1-20191029121225.zip	Thomas Dück	<ul style="list-style-type: none"> • create project with TE scripts • new board variants
2019-04-02	18.1	TEI0003-02-test_board-quartus_18.1-20190402.zip	Thomas Dück	<ul style="list-style-type: none"> • initial release

Table 1: Design Revision History

5.3 Release Notes and Know Issues

Issues	Description	Workaround	To be fixed version
No known issues	---	---	---

Table 2: Known Issues

5.4 Requirements

5.4.1 Software

Software	Version	Note
Quartus	18.1	needed
NIOS II SBT for Eclipse	18.1	needed

Table 3: Software

5.4.2 Hardware

Design supports following modules:

Module Model	PCB Revision Support	Board Part Short Name	DDR	EPCQ Flash	Others	Notes
TEI0003-02	REV01, REV02	25_C8_8MB	8MByte	2 MByte	NA	NA
TEI0003-02 A	REV2	25_C8_8MB	8MByte	2 MByte	NA	NA

Table 4: Hardware Modules

Design supports following carriers:

Carrier Model	Notes

Table 5: Hardware Carrier

Additional HW Requirements:

Additional Hardware	Notes
USB Cable for JTAG/UART	Check Carrier Board and Programmer for correct type

Table 6: Additional Hardware

5.5 Content

For general structure and of the reference design, see [Project Delivery - Intel devices](#)¹

5.5.1 Design Sources

Type	Location	Notes
Quartus	<design name>/source_files/ quartus	Quartus Project will be generated by TE Scripts
Software	<design name>/source_files/ software	Additional Software will be generated by TE Scripts

Table 7: Design sources

5.5.2 Prebuilt

File	File-Extension	Description
SOPC Information File	*.sopcinfo	File with description of the .qsys file to create software for the target hardware
JTAG indirect configuration file	*.jic	Flash configuration File
Diverse Reports	---	Report files in different formats
Software-Application-File	*.elf	Software Application for NIOS II processor system

Table 8: Prebuilt files (only on ZIP with prebuilt content)

5.5.3 Download

Reference Design is only usable with the specified Quartus version. Do never use different Versions of Quartus Software for the same Project.


Reference Design is available on:

- [TEI0003 "Test Board" Reference Design](#)²

¹ <https://wiki.trenz-electronic.de/display/PD/Project+Delivery+-+Intel+devices>

² https://shop.trenz-electronic.de/Download/?path=Trenz_Electronic/Modules_and_Module_Carriers/2.5x6.15/TEI0003/Reference_Design/18.1/test_board

6 Design Flow

 Reference Design is available with and without prebuilt files. It's recommended to use TE prebuilt files for first lunch.

Trenz Electronic provides a tcl based built environment based on Quartus Design Flow.

See also:

- [Project Delivery - Intel devices³](#)

The Trenz Electronic FPGA Reference Designs are TCL-script based projects. Command files for execution will be generated with "_create_win_setup.cmd" on Windows OS and "_create_linux_setup.sh" on Linux OS.

TE Scripts are only needed to generate the quartus project, all other additional steps are optional and can also be executed by Intel Quartus/SDK GUI.

1. Open _create_win_setup.cmd/_create_linux_setup.sh and follow instructions on shell:
2. Press 0 and enter to start "Module Selection Guide"
3. Create Project (follow instruction of the product selection guide), settings file will be configured automatically during this process
 - a. (optional for manual changes) Select correct device and Quartus install path on "design_basic_settings.cmd"/ "design_basic_settings.sh" and create Quartus project with "quartus_create_project_batchmode.cmd"/"quartus_create_project_batchmode.sh"

³ <https://wiki.trenz-electronic.de/display/PD/Project+Delivery+-+Intel+devices>

7 Launch

7.1 Programming

7.1.1 JTAG

Not used on this Example.

7.1.2 EPCQ16(A) Flash

1. Connect the Module to USB-Port
2. Open Quartus project with "quartus_open_existing_project_guiemode.cmd"/
"quartus_open_existing_project_guiemode.sh"
3. Open the Quartus Prime Programmer from *Tools* → *Programmer*
4. If the correct configuration file is not set:
 - a. Delete other files
 - b. Click "Add file..."
 - c. select the correct *.jic file (**created project file**: <design_name>/quartus/output_files/test_board.jic
or prebuilt file: <design_name>/prebuilt/<board_part_short_name>/programming_files/*.jic)
 - d. enable *Program/Configure*
5. Click start
6. After Flash is programmed, press the reset button

7.2 Usage

1. Prepare Hardware like described on section [Programming](#)(see page 10)
2. Connect UART USB (most cases same as JTAG)

7.2.1 UART

1. Open Serial Console "PuTTY"
2. Change settings in category "Session"
 - a. Connection Type: Serial
 - b. COM Port: see device manager (Win OS), Linux OS → see `dmesg |grep tty`
 - c. Speed: 115200
3. Select "Implicit CR in every LF" in category "Terminal"
4. Click *Open*
5. Press reset button at module
6. You can toggle between following LED sequences by pressing user button
 - a. Spirit level
 - b. Case statement sequence
 - c. Shift register sequence
 - d. Knightrider sequence
 - e. Pulse-width modulation sequence

8 Appx. A: Change History and Legal Notices

8.1 Document Change History

To get content of older revision go to "Change History" of this page and select older document revision number.


Date	Document Revision	Authors	Description
 2019-11-11	v.5(see page 5)	Thomas Dück ⁴	<ul style="list-style-type: none"> • add bash files for Linux OS
2019-10-29	v.3	Thomas Dück	<ul style="list-style-type: none"> • change design to TE scripts • new board variants
2019-04-03	v.2	Thomas Dück	<ul style="list-style-type: none"> • Initial release 18.1
--	all	Thomas Dück ⁵	--

Table 9: Document change history.

8.2 Legal Notices

8.3 Data Privacy

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

8.4 Document Warranty

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⁴ <https://wiki.trenz-electronic.de/display/~t.dueck>

⁵ <https://wiki.trenz-electronic.de/display/~t.dueck>

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8.8 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.

8.9 REACH, RoHS and WEEE

REACH

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RoHS

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

WEEE

⁶ <http://guidance.echa.europa.eu/>


⁷ <https://echa.europa.eu/candidate-list-table>

⁸ <http://www.echa.europa.eu/>

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.

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