

TEI0001 Test Board

Public Docs

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1 Overview

NIOS II Design with SDRAM controller, flash memory test and different LED sequences.

Refer to <http://trenz.org/max1000-info> for the current online version of this manual and other available documentation.

1.1 Key Features

- Quartus Prime Lite 19.1
- NIOS II
- SPI
- UART
- User Flash memory
- SDRAM memory
- 3-axis Accelerometer
- User LEDs
- User buttons

1.2 Revision History

Date	Quartus	Project Built	Authors	Description
2020-10-19	19.1 Lite	TEI0001-test_board_noprebuilt-quartus_19.1.0-20201019101714.zip TEI0001-test_board-quartus_19.1.0-20201019101651.zip	Thomas Dück	<ul style="list-style-type: none"> • bugfixes
2020-07-07	19.1 Lite	TEI0001-test_board_noprebuilt-quartus_19.1.0-20200707153033.zip TEI0001-test_board-quartus_19.1.0-20200707153205.zip	Thomas Dück	<ul style="list-style-type: none"> • bugfixes • script update
2020-05-12	19.1 Lite	TEI0001-test_board_noprebuilt-quartus_19.1.0-20200512095852.zip TEI0001-test_board-quartus_19.1.0-20200512100037.zip	Thomas Dück	<ul style="list-style-type: none"> • 19.1 update

Date	Quartus	Project Built	Authors	Description
2019-11-11	18.1	TEI0001-test_board_noprebuilt-quartus_18.1-20191111104201.zip TEI0001-test_board-quartus_18.1-20191111104348.zip	Thomas Dück	<ul style="list-style-type: none"> add bash files for Linux OS
2019-10-28	18.1	TEI0001-test_board_noprebuilt-quartus_18.1-20191028120819.zip TEI0001-test_board-quartus_18.1-20191028120521.zip	Thomas Dück	<ul style="list-style-type: none"> create project with TE scripts new assembly variants
2019-04-02	18.1	TEI0001-03-08-C8-test_board-quartus_18.1-20190402.zip	Thomas Dück	<ul style="list-style-type: none"> initial release

1 Design Revision History

1.3 Release Notes and Known Issues

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

2 Known Issues

1.4 Requirements

1.4.1 Software

Software	Version	Note
Quartus Prime Lite	19.1	needed
NIOS II SBT for eclipse	---	optional

3 Software

1.4.2 Hardware

Complete List is available on <design_name>/board_files/*_devices.csv

Design supports following modules:

Module Model	Board Part Short Name	PCB Revision Support	DDR	QSPI Flash	Others	Notes
TEI0001-03-08-C8	08_C8_8MB	REV02, REV03	8MByte	64MBit	NA	NA
TEI0001-03-16-C8	16_C8_8MB	REV02, REV03	8MByte	64MBit	NA	NA
TEI0001-03-16-C8A	16_C8A_32MB	REV03	32MByte	64MBit	NA	NA
TEI0001-03-16-C8P	16_C8P_8MB	REV03	8MByte	64MBit	NA	NA

4 Hardware Modules

Design supports following carriers:

Carrier Model	Notes

5 Hardware Carrier

Additional HW Requirements:

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

6 Additional Hardware

1.5 Content

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

1.5.1 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

7 Design sources

1.5.2 Prebuilt

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

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

8 Prebuilt files (only on ZIP with prebuilt content)

1.5.3 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:

- [TEI0001 "Test Board" Reference Design²](#)

² https://shop.trenz-electronic.de/Download/?path=Trenz_Electronic/Modules_and_Module_Carriers/2.5x6.15/TEI0001/Reference_Design/19.1/test_board

2 Design Flow

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

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

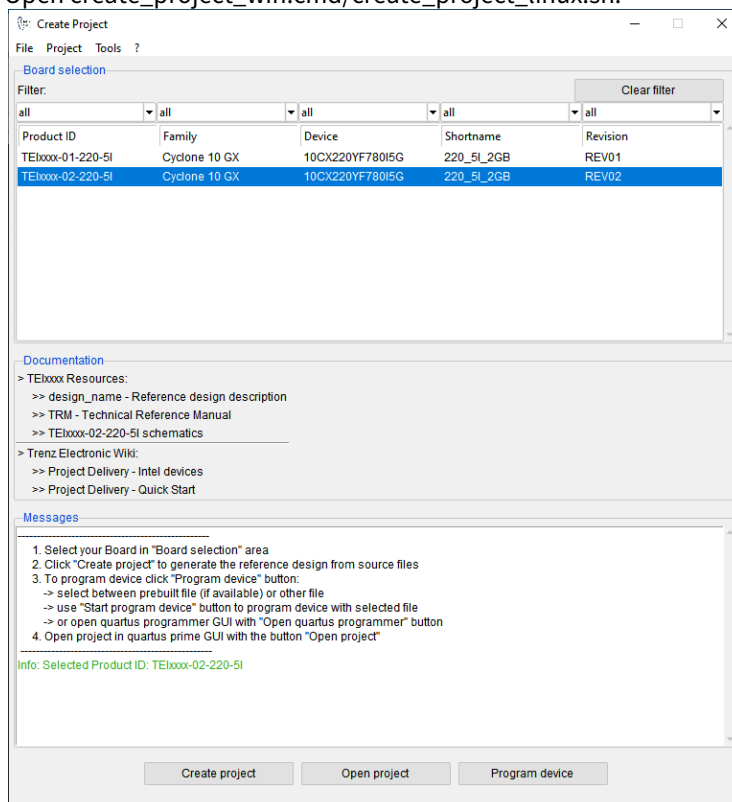
See also:

- [Project Delivery - Intel devices](#)³

The Trenz Electronic FPGA Reference Designs are TCL-script based projects. To create a project, open a project or program a device execute "create_project_win.cmd" on Windows OS and "create_project_linux.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. For currently Scripts limitations on Win and Linux OS see: [Project Delivery - Intel devices](#) → [Currently limitations of functionality](#)⁴

1. Open create_project_win.cmd/create_project_linux.sh:




2. Select Board in "Board selection"
3. Click on "Create project" button to create project
 - a. (optional for manual changes) Select correct quartus installation path in "<design_name>/settings/design_basic_settings.tcl"

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

⁴ <https://wiki.trenz-electronic.de/display/PD/Project+Delivery+-+Intel+devices#ProjectDelivery-Inteldevices-Currentlylimitationsoffunctionality>

3 Launch

3.1 Programming

 Check Module and Carrier TRMs for proper HW configuration before you try any design.

3.1.1 MAX10 Flash

1. Connect the Module to USB-Port
2. Open create_project_win.cmd/create_project_linux.sh
3. Select correct board in "Board selection"
4. Click on "Program device" button
 - a. if prebuilt files are available: select "Program prebuilt file"
 - b. using own generated programming file: select "Program other file" and click on "Browse ..." to open own generated programming file
 - c. (optional) click on "Open programmer GUI" to program device with Quartus programmer GUI
5. Click on "Start program device" button

3.1.2 JTAG

Not used on this example.

3.2 Usage

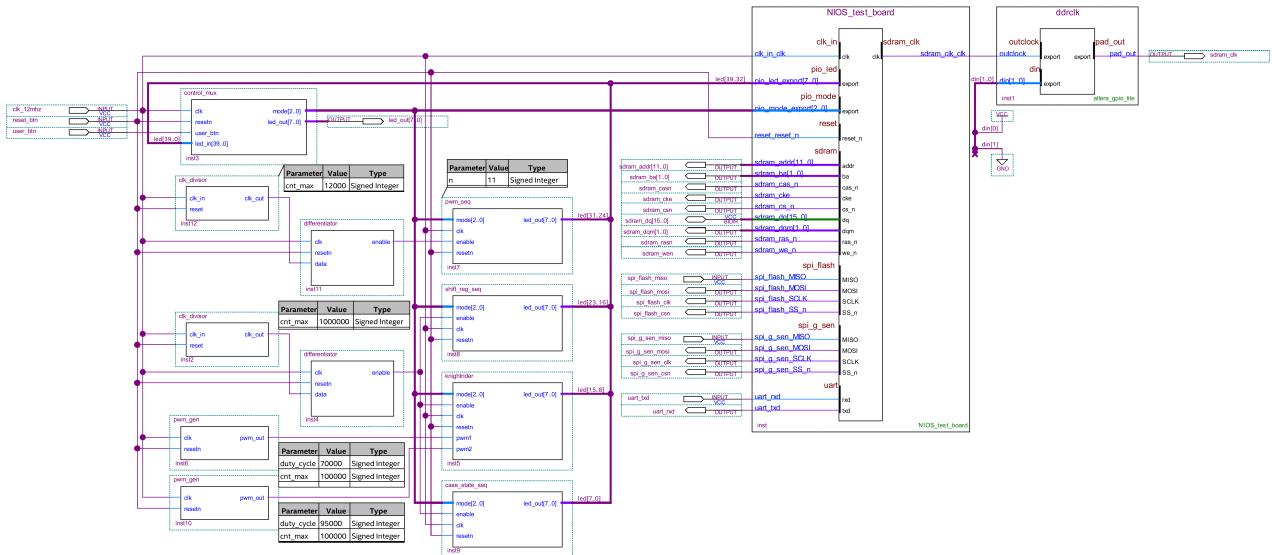
1. Prepare Hardware like described on section [Programming](#)(see page 9)
2. Connect UART USB (most cases same as JTAG)

3.2.1 UART

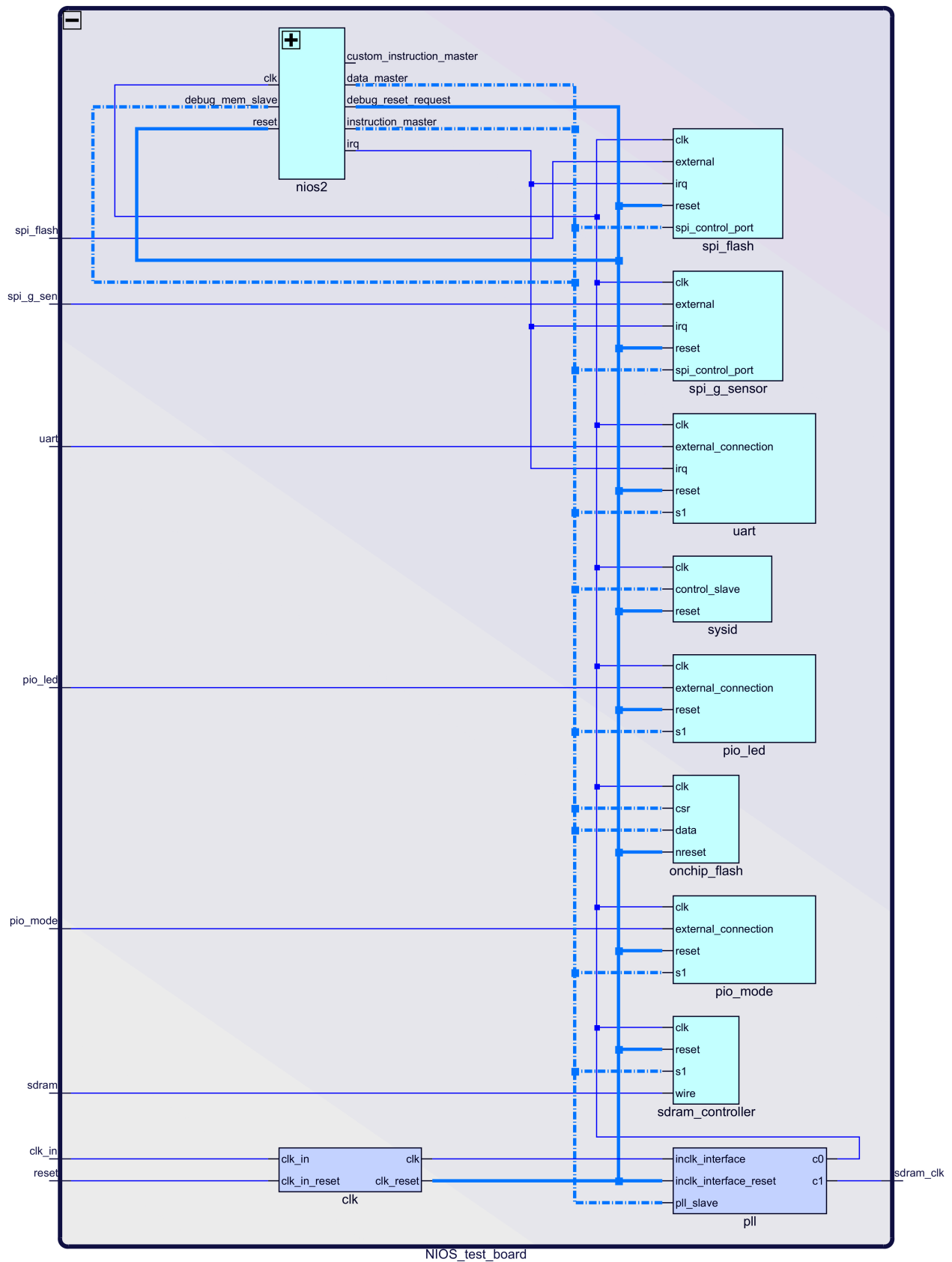
1. Open Serial Console (e.g. PuTTY)
 - a. COM Port: Win OS see device manager, Linux OS see `dmesg | grep tty` (UART is *USB1)
 - b. Speed: 115200
2. Press reset button on the module
3. Toggle between following modes by pressing user button
 - a. Spirit level
 - b. Winbond SPI flash memory test
 - c. Shift register sequence
 - d. Knightrider sequence
 - e. Case statement sequence

4 System Design - Quartus

4.1 Block Design



1 Block Design - Project



2 Block Design - Platform Designer

5 Software Design - SDK

5.1 Application

Template location: <design_name>/source_files/software/


5.1.1 test_board

Software example to test TEI0001 module.

6 Appx. A: Change History and Legal Notices

6.1 Document Change History

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

Date	Document Revision	Authors	Description
 2020-10-19	v.12 (see page 4)	Thomas Dück ⁵	<ul style="list-style-type: none"> • bugfixes • script update
2020-05-13	v.10	Thomas Dück	<ul style="list-style-type: none"> • 19.1 release
2019-11-11	v.8	Thomas Dück	<ul style="list-style-type: none"> • add bash files for Linux OS
2019-10-29	v.6	Thomas Dück	<ul style="list-style-type: none"> • change design to TE scripts • new variants
2019-04-03	v.4	Thomas Dück	<ul style="list-style-type: none"> • Initial release 18.1
--	all	Thomas Dück ⁶	--

9 Document change history.

6.2 Legal Notices

6.3 Data Privacy

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

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

⁶ <https://wiki.trenz-electronic.de/display/~t.dueck>

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6.9 REACH, RoHS and WEEE

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RoHS

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

⁷ <http://guidance.echa.europa.eu/>

⁸ <https://echa.europa.eu/candidate-list-table>

⁹ <http://www.echa.europa.eu/>

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.

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