TEI0010 Test Board

Table of contents

Overview

NIOS II Design with SDRAM controller, different sensors and LED sequences.

Refer to http://trm.tebis.info for the current online version of this manual and other available documentation.

Key Features

- Quartus Prime Lite 21.1
- NIOS II
- SPI
- I2C
- UART
- ADC
- User flash memory
- SDRAM memory
- 3-axis accelerometer
- Temperature sensor
- Smoke detector
- User LEDs
- User buttons

Revision History

Date	Quartus	Project Built	Authors	Description
2022-04-21	21.1 Lite	TEI0010-test_board_noprebuilt-quartus_21.1.0-20220421145917.zip TEI0010-test_board-quartus_21.1.0-20220421150010.zip	Thomas Dück	• update to Quartus Prime Lite 21.1
2021-07-09	20.1 Lite	TEI0010-test_board_noprebuilt-quartus_20.1.1-20210709102433.zip TEI0010-test_board-quartus_20.1.1-20210709102350.zip	Thomas Dück	• update to Quartus Prime Lite 20.1 • TE scripts update
2020-10-19	19.1 Lite	TEI0010-test_board_noprebuilt-quartus_19.1.0-20201019102006.zip TEI0010-test_board-quartus_19.1.0-20201019101953.zip	Thomas Dück	• script update • bugfixes

2020-05-13	19.1 Lite	TEI0010-test_board_noprebuilt-quartus_19.1.0-20200513105940.zip TEI0010-test_board-quartus_19.1.0-20200513110730.zip	Thomas Dück	• 19.1 update
2019-11-11	18.1	TEI0010-test_board_noprebuilt-quartus_18.1-20191111104210.zip TEI0010-test_board-quartus_18.1-20191111104330.zip	Thomas Dück	• create project with TE scripts • new board variants
2019-04-17	18.1	TEI0010-02-08-C8-test_board-quartus_18.1-20190417.zip	Thomas Dück	• initial release

Design Revision History

Release Notes and Know Issues

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

Known Issues

Requirements

Software

Software	Version	Note
Quartus Prime Lite	21.1	needed
NIOS II SBT for Eclipse	---	optional

Software

Hardware

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

Design supports following modules:

Module Model	PCB Revision Support	Board Part Short Name	DDR	QSPI Flash	Others	Notes
TEI0010-02-08-C8*	REV02	08_C8_8MB	8MByte	64MBit	---	---

*used as reference

Hardware Modules

Design supports following carriers:

Carrier Model	Notes
---	---

*used as reference

Hardware Carrier

Additional HW Requirements:

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

*used as reference

Additional Hardware

Content

For general structure and of the reference design, see Project Delivery - Intel devices

Design Sources

Type	Location	Notes
Quartus	<project folder>/source_files /quartus	Quartus project will be generated by TE Scripts
Software	<project folder>/source_files /software	Additional software will be generated by TE Scripts

Design sources

Prebuilt

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

Prebuilt files (only on ZIP with prebuilt content)

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:

- TEI0010 "Test Board" Reference Design

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.

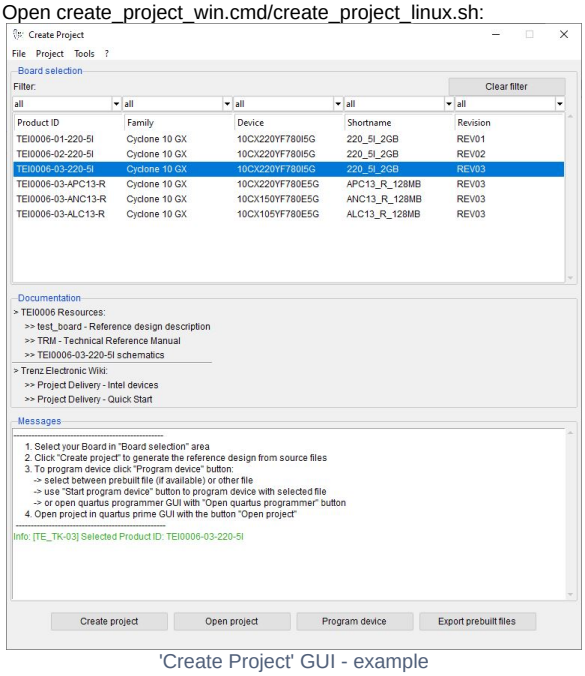
See also:

- Project Delivery - Intel devices

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 executed by Intel Quartus/SDK GUI. For currently Scripts limitations on Win OS and Linux OS see: Project Delivery - Intel devices Currently limitations of functionality

1. Open create_project_win.cmd/create_project_linux.sh:



'Create Project' GUI - example

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 "*<project folder>/settings/design_basic_settings.tcl*"

Launch

Programming

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

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

JTAG

Not used on this example.

Usage

1. Prepare Hardware like described on section Programming
2. Connect UART USB (most cases same as JTAG)

UART

1. Open Serial Console (e.g. PuTTY)
    a. select COM Port

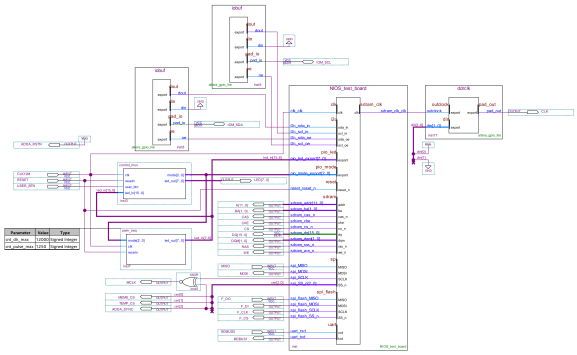
    > ⓘ Win OS: see device manager
    >
    > Linux OS: see dmesg | grep tty (UART is *USB1)

    b. Speed: 115200
2. Press reset button
3. Console output depends on used Software project, see Software Design - SDK#Application

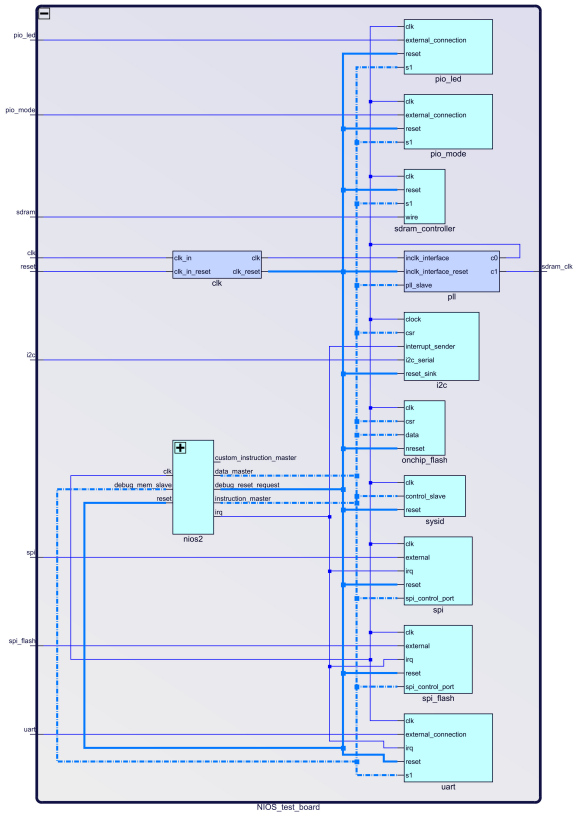
System Design - Quartus

Block Design

The block designs may differ depending on the assembly variant.



Block Design - Project



Block Design - NIOS_test_board.qsys

Block Design - Platform Designer

Software Design - SDK

Application

Used software project depends on board assembly variant. Template location: *<project folder> /source_files/software/*

test_board

Software example to test TEI0010 module.

- You can toggle between following modes by pressing user button
    1. Spirit level
    2. Winbond SPI flash memory test
    3. Temperature measurement
    4. Smoke detector
    5. ADC - AD5592R

Appx. A: Change History and Legal Notices

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
Error renderi ng macro 'page-info' Ambiguo us method overload ing for method jdk. proxy27 9.$Proxy	**Error renderi ng macro 'page-info'** Ambiguo us method overload ing for method jdk. proxy27 9.$Proxy	**Error renderi ng macro 'page-info'** Ambiguo us method overload ing for method jdk. proxy27 9.$Proxy	• update to Quartus Prime Lite 21.1

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2021-07-09	v.8	Thomas Dück	• update to Quartus Prime Lite 20.1 • document style update • script update
2020-10-19	v.6	Thomas Dück	• script update • bugfixes

2020-05-13	v.4	Thomas Dück	• 19.1 release
2019-11-11	v.3	Thomas Dück	• change design to TE scripts • new variants
2019-04-17	v.1	Thomas Dück	• Initial release 18.1
--	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.	--

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Document change history.

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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]