

TEI0006 Test Board

Table of contents

Overview

- 1 Overview

Quartus Design with NIOS V/m and software example "simple_socket_server" and "hello_tei0006".

- 1.2 Revision History

Refer to <http://trac.ti.com/cgi-bin/view.cgi/~redir!1234567890> for the online version of this manual and other available documentation.

- 1.4 Requirements

- 1.4.1 Software

- 1.4.2 Hardware

- 1.5 Content

- 1.5.1 Design Sources

- 1.5.2 Prebuilt

- 1.5.3 Download

Key Features

- Quartus 22.4 Pro
- NIOS V/m
- Design Flow
- UART
- Launch
- ETH
- 3.1 Programming
- QSPI flash memory
- 3.1.1 Get prebuilt boot binaries
- 3.1.2 QSPI
- 3.1.3 JTAG
- User LED
- 3.2 Usage
- 3.2.1 UART
- 3.2.2 JTAG
- 4.1 Block Design
- 4.1.1 Block Design
- 5 Software Design - SDK
- 5.1 AppQuas
- 5.1.1 hello_tei0006
- 5.1.2 simple_socket_server

Revision History

Date	Quartus	Project Built	Authors	Description
2024-01-09	22.4 Pro	TEI0006-test_board- simple_socket_server- 20240109135625.zip	Thomas Dück	Fixed bugs in TE scripts
2023-12-04	22.4 Pro	TEI0006- test_board_noprebui- lt-quartus_22.4.0- 20231204134534.zip	Thomas Dück	- update to Quartus Prime Pro 22.4 - TE scripts update - new assembly variants
2023-04-13	20.4 Pro	TEI0006- test_board_noprebui- lt-quartus_20.4.0- 20230411171022.zip	Thomas Dück	- change "Serial Flash Controller II" IP Core to "QUAD SPI Controller II" IP Core - bugfix offset value of hex file

2021-06-15	20.4 Pro	TEI0006-test_board_noprebui lt-quartus_20.4.0- 20210615142627.zip TEI0006-test_board- quartus_20.4.0- 20210615142455.zip	Thomas Dück	• update to Quartus Prime Pro 20.4 • TE scripts update • new assembly variants
2020-10-19	19.4 Pro	TEI0006-test_board_noprebui lt-quartus_19.4.0- 20201019101920.zip TEI0006-test_board- quartus_19.4.0- 20201019101840.zip	Thomas Dück	• script update • bugfixes
2020-05-13	19.4 Pro	TEI0006-test_board_noprebui lt-quartus_19.4.0- 20200513124953.zip TEI0006-test_board- quartus_19.4.0- 20200513125247.zip	Thomas Dück	• TE scripts update
2020-03-09	19.4 Pro	TEI0006-test_board- quartus_19.4- 20200309134933.zip TEI0006- test_board_noprebui lt-quartus_19.4- 20200309135555.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 Pro	22.4	Nios V/m license is needed. For more information see: Intel Nios V Processors
Ashling RiscFree IDE for Intel FPGAs	22.4	needed

Software

Hardware

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

Design supports following modules:

Module Model	Board Part Short Name	PCB Revision Support	DDR	QSPI Flash	Others	Notes
TEI0006-03-220-5I*	220_5I_2GB	REV03 REV02 REV01	2GB	128MB	--	--
TEI0006-03-APC13-R	APC13R	REV03	128MB	128MB	--	without ETH PHY
TEI0006-03-ANC13-R	ANC13R	REV03	128MB	128MB	--	without ETH PHY
TEI0006-03-ALC13-R	ALC13R	REV03	128MB	128MB	--	without ETH PHY
TEI0006-03-ALC13	ALC13	REV03	128MB	128MB	--	--
TEI0006-04-ALC13A	ALC13	REV04	128MB	128MB	--	--
TEI0006-04-ALE13A	ALE13	REV04	128MB	128MB	--	--
TEI0006-04-ANE13A	ANE13	REV04	128MB	128MB	--	--
TEI0006-04-APE23A	APE23	REV04	2GB	128MB	--	--
TEI0006-04-API23A	API23	REV04	2GB	128MB	--	--
TEI0006-04-S004	API23R	REV04	2GB	128MB	--	without ETH PHY
TEI0006-04-S005	APE23	REV04	2GB	128MB	--	--
TEI0006-04-S006	BPI23	REV04	2GB	128MB	--	--
TEI0006-04-S007	APE23R	REV04	2GB	128MB	--	without ETH PHY

*used as reference

Hardware Modules

Design supports following carriers:

Carrier Model	Notes
TEIB0006*	

*used as reference

Hardware Carrier

Additional HW Requirements:

Additional Hardware	Notes
USB cable for JTAG/UART	Check Carrier Board and Programmer for correct type
RJ45 ethernet cable	connect carrier board to network

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
	<project folder>/source_files /<Board Part Short Name> /quartus	optional, source files for specific assembly variants
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
SRAM Object File	*.sof	Ram configuration file
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

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:

- [TEI0006 "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.

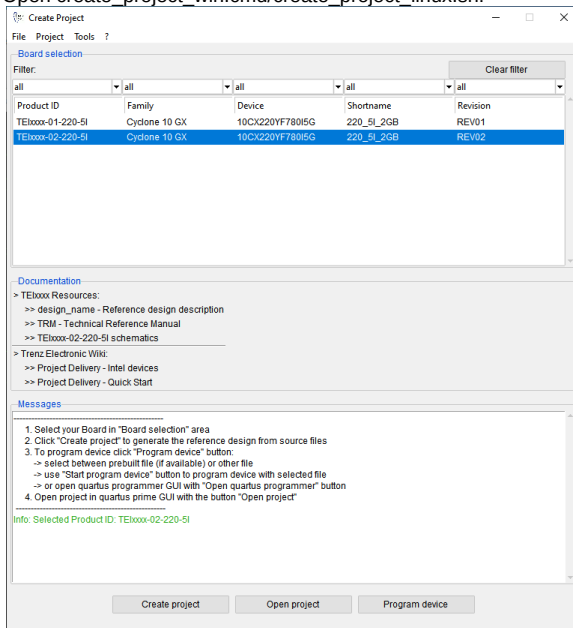
See also:

- [Project Delivery - Intel devices](#)

The Trezz 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](#)

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.

Reference Design is also available with prebuilt files. It's recommended to use TE prebuilt files for first launch.

Get prebuilt boot binaries

1. Run create_project_win.cmd/create_project_linux.sh
2. Select a Module in 'Board selection'
3. Click on the 'Export prebuilt files' button

- a. Folder `<project folder>/_binaries_<Article Name>` with subfolder `boot_linux` will be generated and opened

QSPI

1. Connect JTAG and power on carrier with module
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 HW like described on section [Programming](#)
2. Connect UART USB (most cases same as JTAG)
3. Connect your board to the network
4. Power on PCB

UART

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

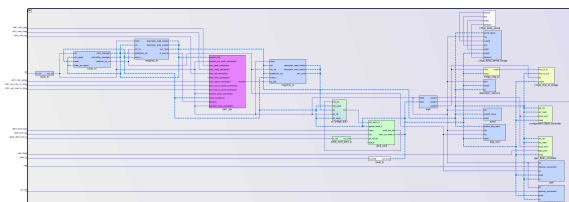
 Win OS: see device manager

Linux OS: see `ls -l dev/serial/by-id` (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 design may differ depending on the assembly variant.



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/

hello_tei0006

Hello TEI0006 is a Hello World example as endless loop instead of one console output.

simple_socket_server

Software example "Simple Socket Server" from eclipse (modified source files for TEI0006 board).

- If DHCP Server is not available:
 1. Open software project in sdk gui (e.g. Ashling RiscFree IDE for Intel FPGAs 22.4) and set in the main.c file the varaibles:
 - .use_dhcp = !DEF_TRUE
 - .ipv4_addr_str = <your static IP address>
 - .ipv4_gateway_str =<your gateway>
 2. Rebuild the software project and download the *.elf file to the device.
 3. Open the command shell and enter "telnet <ip_address> 80" to connect to the simple socket server

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 rendering macro 'page-info' Ambiguous method overload	Error rendering macro 'page-info' Ambiguous method overload	Error rendering macro 'page-info' Ambiguous method overload	• update to Quartus Prime Pro 22.4 • new assembly variants

ing for
method
jdk.
proxy24
1.\$Proxy
3496#ha
sConten
tLevelPe
rmission
.
Cannot
resolve
which
method
to
invoke
for [null,
class
java.
lang.
String,
class
com.
atlassian
.
confluen
ce.
pages.
Page]
due to
overlapp
ing
prototyp
es
between
:
[interfac
e com.
atlassian

ing for
method
jdk.
proxy24
1.\$Proxy
3496#ha
sConten
tLevelPe
rmission
.
Cannot
resolve
which
method
to
invoke
for [null,
class
java.
lang.
String,
class
com.
atlassian
.
confluen
ce.
pages.
Page]
due to
overlapp
ing
prototyp
es
between
:
[interfac
e com.
atlassian

ing for
method
jdk.
proxy24
1.\$Proxy
3496#ha
sConten
tLevelPe
rmission
.
Cannot
resolve
which
method
to
invoke
for [null,
class
java.
lang.
String,
class
com.
atlassian
.
confluen
ce.
pages.
Page]
due to
overlapp
ing
prototyp
es
between
:
[interfac
e com.
atlassian

. confluen ce.user. Conflue nceUser , class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject] [interfac e com. atlassian .user. User, class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject]	. confluen ce.user. Conflue nceUser , class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject] [interfac e com. atlassian .user. User, class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject]	. confluen ce.user. Conflue nceUser , class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject] [interfac e com. atlassian .user. User, class java. lang. String, class com. atlassian . confluen ce.core. Content EntityOb ject]	
2023-04-13	v.12	Thomas Dück	• Design files update

2021-07-26	v.10	Thomas Dück	• update to Quartus Prime Pro 20.4 • new assembly variants • document style update • script update
2020-10-19	v.6	Thomas Dück	• script update • bugfixes
2020-05-13	v.5	Thomas Dück	• Design files update
2020-03-18	v.4	Thomas Dück	• initial release 19.4
--	all	Error renderi ng macro 'page- info' Ambiguo us method overload ing for method jdk. proxy24 1.\$Proxy 3496#ha sConten tLevelPe rmission . Cannot resolve which method to	--

invoke
for [null,
class
java.
lang.
String,
class
com.
atlassian
.
confluen
ce.
pages.
Page]
due to
overlapp
ing
prototyp
es
between
:
[interfac
e com.
atlassian
.
confluen
ce.user.
Conflue
nceUser
, class
java.
lang.
String,
class
com.
atlassian
.
confluen
ce.core.

		Content	
		EntityOb	
		ject]	
		[interfac	
		e com.	
		atlassian	
		.user.	
		User,	
		class	
		java.	
		lang.	
		String,	
		class	
		com.	
		atlassian	
		.	
		confluen	
		ce.core.	
		Content	
		EntityOb	
		ject]	

Document change history

Legal Notices

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.

Error rendering macro 'page-info'

Ambiguous method overloading for method `jdk`.

`proxy241.$Proxy3496#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]`