

# TE0725 Test Board

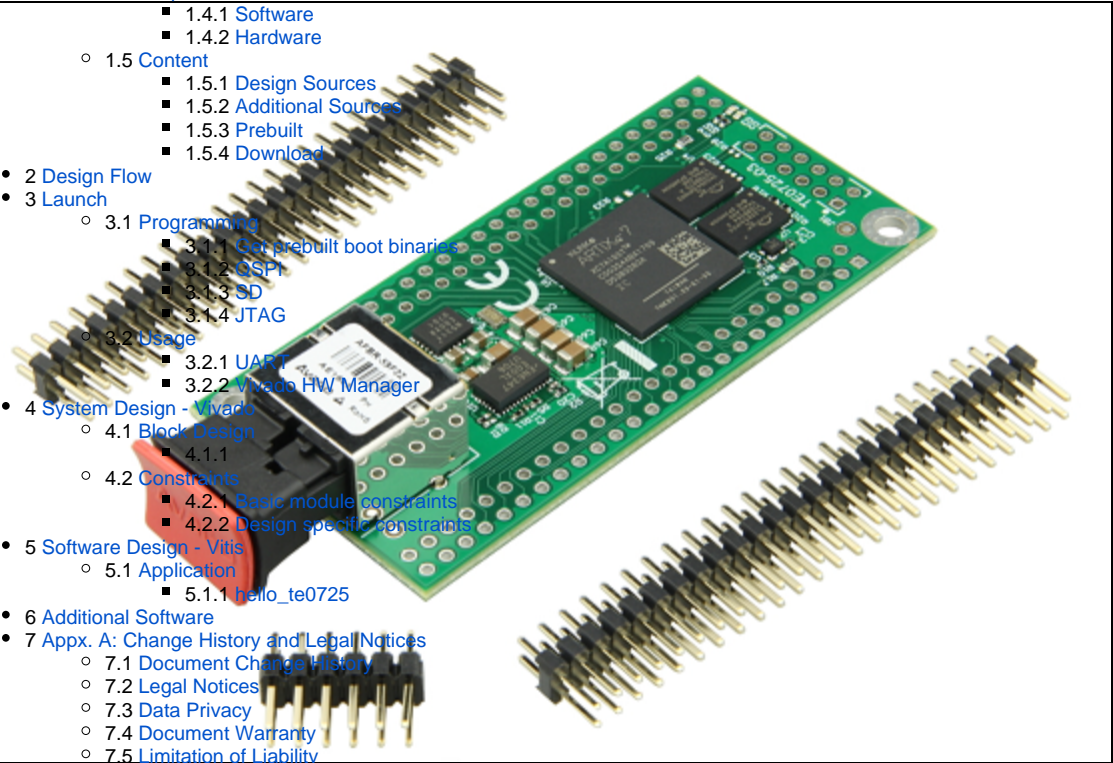
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MicroBlaze Design with Hello TE0725 example in endless loop.

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Refer to <http://www.xilinx.com/products/boards-and-kits/catalog/te0725/index.html> for the current online version of this manual and other available documentation.

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## Key Features

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- Vivado/Vitis 2021.2
- MicroBlaze
- QSPI
- I2C
- UART

## Revision History

Date	Vivado	Project Built	Authors	Description
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2022-08-29	2021.2	TE0725-test_board_noprebui lt-vivado_2021.2- build_15_20220829 124226.zip TE0725-test_board- vivado_2021.2- build_15_20220829 124226.zip	Waldemar Hanemann	<ul style="list-style-type: none"> <li>• 2021.2 update</li> <li>• Documentation style update</li> </ul>
2020-04-20	2019.2	TE0725-test_board_noprebui lt-vivado_2019.2- build_10_20200420 092827.zip TE0725-test_board- vivado_2019.2- build_10_20200420 092815.zip	John Hartfiel	<ul style="list-style-type: none"> <li>• 2019.2 update</li> </ul>
2018-08-09	2018.2	TE0725-test_board_noprebui lt-vivado_2018.2- build_02_20180809 122533.zip TE0725-test_board- vivado_2018.2- build_02_20180809 122018.zip	John Hartfiel	<ul style="list-style-type: none"> <li>• 2018.2 update</li> </ul>
2018-03-18	2017.4	TE0725-test_board_noprebui lt-vivado_2017.4- build_07_20180319 171220.zip TE0725-test_board- vivado_2017.4- build_07_20180319 171209.zip	John Hartfiel	<ul style="list-style-type: none"> <li>• Board Part update reference link only</li> </ul>
2018-03-16	2017.4	TE0725-test_board_noprebui lt-vivado_2017.4- build_07_20180316 163402.zip TE0725-test_board- vivado_2017.4- build_07_20180316 163351.zip	John Hartfiel	<ul style="list-style-type: none"> <li>• initial release</li> </ul>

#### 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
Vitis	2021.2	needed, Vivado is included into Vitis installation

## Software

## Hardware

Basic description of TE Board Part Files is available on [TE Board Part Files](#).

Complete List is available on <design name>/board\_files/\*\_board\_files.csv

Design supports following modules:

Module Model	Board Part Short Name	PCB Revision Support	DDR	QSPI Flash	EMMC	Others	Notes
TE0725-03-15-1C	15_1c	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	NA
TE0725-03-35-2C	35_2c	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	NA
TE0725-03-100-2C	100_2c	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	NA
TE0725-03-100-2CF	100_2c	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	POF assembled
TE0725-03-100-2I9	100_2i	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	NA
TE0725-03-35-2I	35_2i	REV03 REV02 REV01	NA	32MB	NA	8MB HypeRAM	NA

### Hardware Modules

Design supports following carriers:

Carrier Model	Notes
---	

\* used as reference

### Hardware Carrier

Additional HW Requirements:

Additional Hardware	Notes
TE0790 JTAG Programmer	It's not recommended to use TE0790 for power supply( <a href="#">TE0790 TRM#PowerandPower-OnSequence</a> )
External power supply	

\* used as reference

### Additional Hardware

## Content

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

## Design Sources

Type	Location	Notes
Vivado	<project folder>\block_design <project folder>\constraints <project folder>\ip_lib <project folder>\board_files	Vivado Project will be generated by TE Scripts
Vitis	<project folder>\sw_lib	Additional Software Template for Vitis and apps_list.csv with settings automatically for Vitis app generation

Design sources

## Additional Sources

Type	Location	Notes
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Additional design sources

## Prebuilt

File	File-Extension	Description
BIT-File	*.bit	FPGA (PL Part) Configuration File
DebugProbes-File	*.ltx	Definition File for Vivado/Vivado Labtools Debugging Interface
Debian SD-Image	*.img	Debian Image for SD-Card
Diverse Reports	---	Report files in different formats
Hardware-Platform-Specification-Files	*.xsa	Exported Vivado Hardware Specification for Vitis and PetaLinux
LabTools Project-File	*.lpr	Vivado Labtools Project File
MCS-File	*.mcs	Flash Configuration File with Boot-Image (MicroBlaze or FPGA part only)
MMI-File	*.mmi	File with BRAM-Location to generate MCS or BIT-File with *.elf content (MicroBlaze only)
Software-Application-File	*.elf	Software Application for Zynq or MicroBlaze Processor Systems

Prebuilt files (only on ZIP with prebuilt content)

## Download

Reference Design is only usable with the specified Vivado/Vitis/PetaLinux version. Do never use different Versions of Xilinx Software for the same Project.

Reference Design is available on:

- [TE0725 "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 lunch.

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

See also:

- [AMD Development Tools#XilinxSoftware-BasicUserGuides](#)
- [Vivado Projects - TE Reference Design](#)
- [Project Delivery](#).

The Trenz Electronic FPGA Reference Designs are TCL-script based project. 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 vivado project, all other additional steps are optional and can also executed by Xilinx Vivado/Vitis GUI. For currently Scripts limitations on Win and Linux OS see: [Project Delivery Currently limitations of functionality](#)



**Caution!** Win OS has a 260 character limit for path lengths which can affect the Vivado tools. To avoid this issue, use Virtual Drive or the shortest possible names and directory locations for the reference design (for example "x:\<project folder>")

1. Run \_create\_win\_setup.cmd/\_create\_linux\_setup.sh and follow instructions on shell:

## **\_create\_win\_setup.cmd/\_create\_linux\_setup.sh**

```
-----Set design paths-----
-- Run Design with: _create_win_setup
-- Use Design Path: <absolute project path>
-----
-----TE Reference
Design-----
-----
-- (0)  Module selection guide, project creation...prebuilt export...
-- (1)  Create minimum setup of CMD-Files and exit Batch
-- (2)  Create maximum setup of CMD-Files and exit Batch
-- (3)  (internal only) Dev
-- (4)  (internal only) Prod
-- (c)  Go to CMD-File Generation (Manual setup)
-- (d)  Go to Documentation (Web Documentation)
-- (g)  Install Board Files from Xilinx Board Store (beta)
-- (a)  Start design with unsupported Vivado Version (beta)
-- (x)  Exit Batch (nothing is done!)
-----
Select (ex.: '0' for module selection guide):
```

2. Press 0 and enter to start "Module Selection Guide"
3. Create project and follow instructions of the product selection guide, settings file will be configured automatically during this process.
  - optional for manual changes: Select correct device and Xilinx install path on "design\_basic\_settings.cmd" and create Vivado project with "vivado\_create\_project\_guiemode.cmd"



Note: Select correct one, see also [Vivado Board Part Flow](#)

- a. Create hardware description file (.xsa file) for PetaLinux project and export to prebuilt folder

**run on Vivado TCL (Script generates design and export files into "<project folder>\prebuilt\hardware\<short name>")**

```
TE::hw_build_design -export_prebuilt
```



Using Vivado GUI is the same, except file export to prebuilt folder.

#### 4. Generate Programming Files with Vitis

**run on Vivado TCL (Script generates applications and bootable files, which are defined in "test\_board\sw\_lib\apps\_list.csv")**

```
TE::sw_run_vitis -all
TE::sw_run_vitis (optional; Start Vitis from Vivado GUI or start
with TE Scripts on Vivado TCL)
```



Note: Scripts generate applications and bootable files, which are defined in "sw\_lib\apps\_list.csv"

App from Firmware folder will be add into BlockRAM. If you add other app, you must select \*.elf

manually on Vivado



TCL scripts generate also platform project, this must be done manually in case GUI is used. See [Vitis](#)

5. (optional) Copy Application (hello\_te0725.elf) from prebuilt-folder into \firmware\microblaze\_0\ and regenerate design with

**run on Vivado TCL (Script generates design and export files into "<project folder>\prebuilt\hardware\<short name>")**

```
TE::hw_build_design -export_prebuilt
```

## 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.

Xilinx documentation for programming and debugging: [Vivado/SDK/SDSoC-Xilinx Software Programming and Debugging](#)

## Get prebuilt boot binaries

1. Run `_create_win_setup.cmd/_create_linux_setup.sh` and follow instructions on shell
2. Press 0 and enter to start "Module Selection Guide"
  - a. Select assembly version
  - b. Validate selection
  - c. Select create and open delivery binary folder



Note: Folder "<project folder>\\_binaries\_<Article Name>" with subfolder "boot\_<app name>" for different applications will be generated

## QSPI

1. Connect JTAG and power on carrier with module
2. Open Vivado Project with "vivado\_open\_existing\_project\_guimode.cmd" or if not created, create with "vivado\_create\_project\_guimode.cmd"

### run on Vivado TCL (Script programs .mcs-File on QSPI flash)

```
TE::pr_program_flash -swapp hello_te0725
```

3. Press the reset button to start the application and see the output in the console

## SD

Not used on this Example.

## JTAG

1. Connect JTAG and power on PCB
2. Open Vivado HW Manager
3. Program FPGA with Bitfile from "prebuilt\hardware\<short dir>"

## Usage

1. Prepare HW like described on section [Programming](#)
2. Connect UART USB (most cases same as JTAG)
3. 1. FPGA Loads Bitfile from Flash

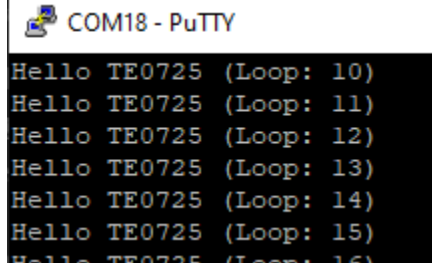
3. Hello Trenz will be run on UART console.

info: Do not reboot, if Bitfile programming over JTAG is used as programming method.

- a. **UART**

Open Serial Console (e.g. putty) Hello TE0725 will run on endless loop.

- i. Speed: 9600
- ii. COM Port: Win OS, see device manager, Linux OS see `dmesg |grep tty` (UART is \*USB1)



Power On PCB (Do not restart, if you use Bitfile programming)

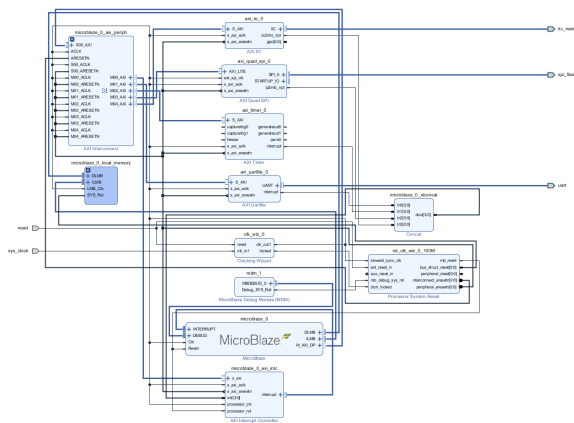
## Vivado HW Manager

- VIO Core for signal control and monitoring is not implemented

## System Design - Vivado

---

### Block Design



## Constraints

### Basic module constraints



#### **\_i\_bitgen\_common.xdc**

```
set_property BITSTREAM.GENERAL.COMPRESS TRUE [current_design]
set_property BITSTREAM.CONFIG.CONFIGRATE 66 [current_design]
set_property CONFIG_VOLTAGE 3.3 [current_design]
set_property CFGBVS VCCO [current_design]
set_property BITSTREAM.CONFIG.SPI_32BIT_ADDR YES [current_design]
set_property BITSTREAM.CONFIG.SPI_BUSWIDTH 4 [current_design]
set_property BITSTREAM.CONFIG.M1PIN PULLNONE [current_design]
set_property BITSTREAM.CONFIG.M2PIN PULLNONE [current_design]
set_property BITSTREAM.CONFIG.M0PIN PULLNONE [current_design]

set_property BITSTREAM.CONFIG.USR_ACCESS TIMESTAMP [current_design]
```

## Design specific constraints

---

## Software Design - Vitis

For SDK project creation, follow instructions from:

[Vitis](#)

## Application

Template location: "<project folder>\sw\_lib\sw\_apps\"

### hello\_te0725

Trenz Hello TE0725 example as endless loop. Output on console.

Template location: \sw\_lib\sw\_apps\hello\_te0725

The printed Text can be modified.

## Additional Software

No additional software is needed.

## 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
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2020-04-20	v.12	John Hartfiel	<ul style="list-style-type: none"> <li>• 2019.2 update</li> <li>• Documentation style update</li> </ul>
2018-08-09	v.9	John Hartfiel	<ul style="list-style-type: none"> <li>• 2018.2 update</li> </ul>
2018.06.05	v.8	John Hartfiel	<ul style="list-style-type: none"> <li>• Board Part Documentation update</li> <li>• Typo correction UART Speed</li> </ul>
2018-03-16	v.5	John Hartfiel	<ul style="list-style-type: none"> <li>• 2017.4 release</li> </ul>
2018-03-12	v.1	<div> Error  renderi  ng  macro  'page-  info'    Ambiguo  us  method  overload  ing for  method </div>	<ul style="list-style-type: none"> <li>• Initial release</li> </ul>

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Document change history.

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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]

