User's Guide

TSWDC155EVM

Abstract

A generic Artix®-7 FPGA based pattern generator and capture card Quick Start User Guide for EVM.

WARNING

When the EVM is energized, never touch the EVM or its electrical circuits, as they could be at high temperatures capable of causing burns.

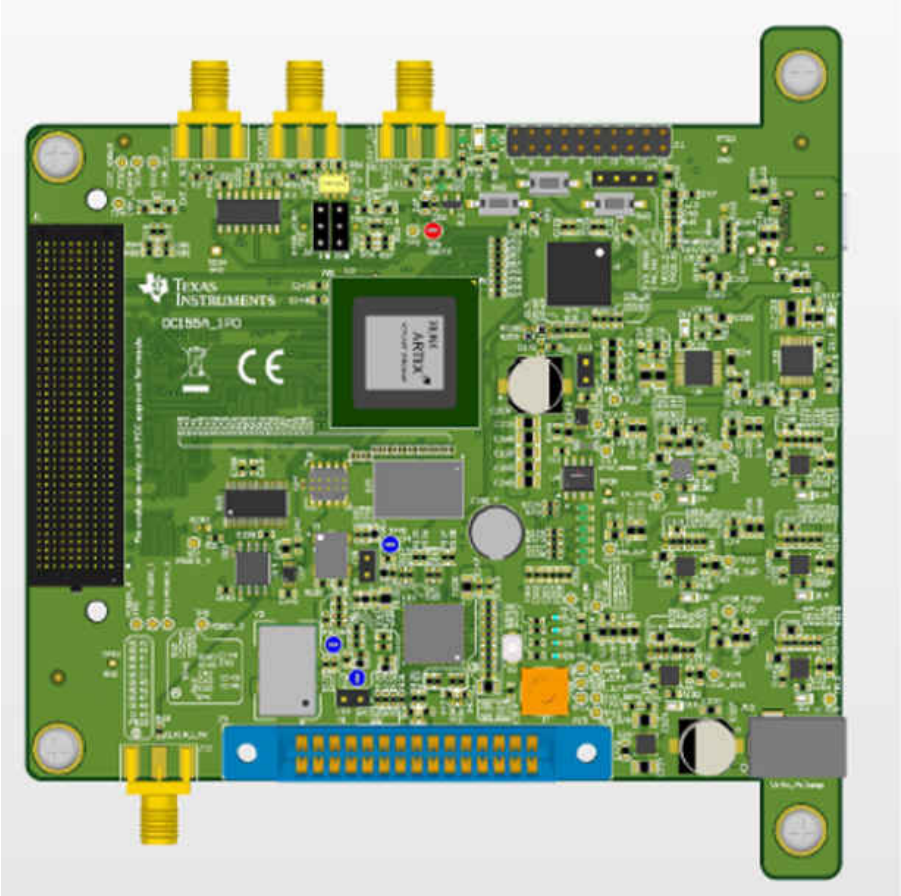


Table of Contents

Trademarks

Artix® is a registered trademark of Advanced Micro Devices.
All trademarks are the property of their respective owners.

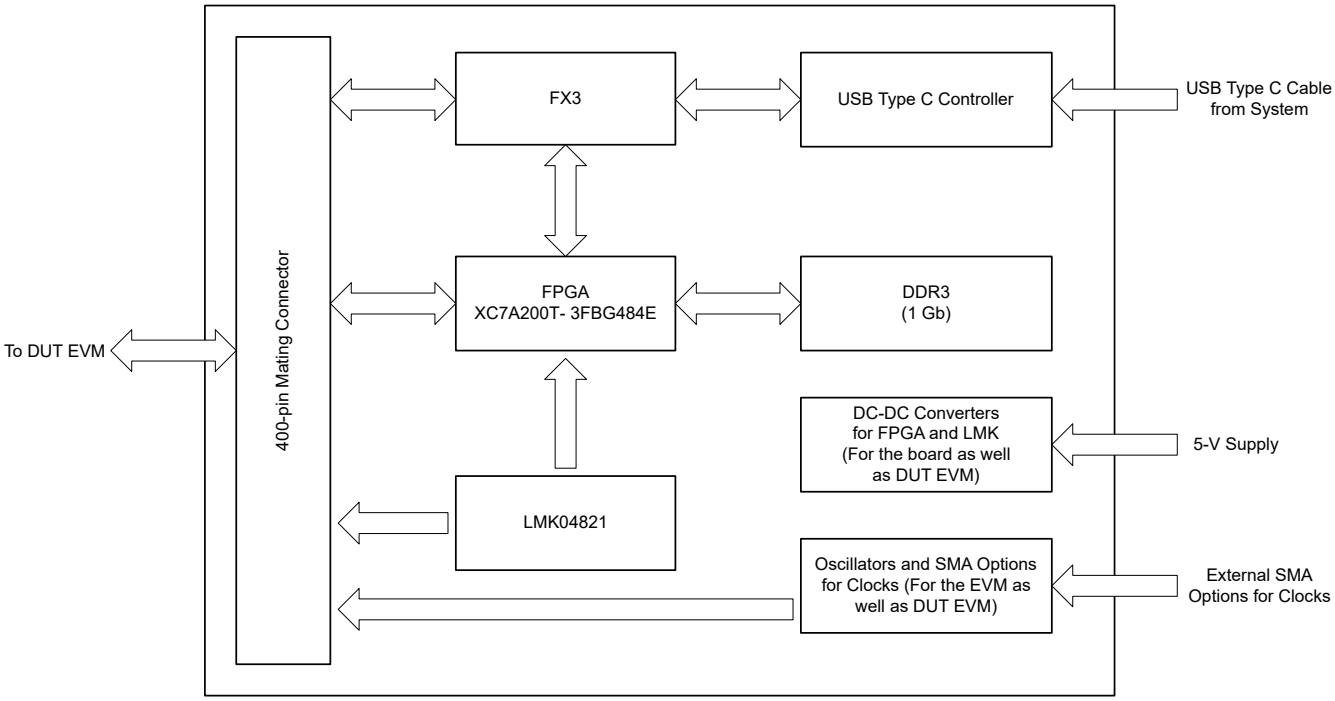
1 Introduction

The TSWDC155 EVM FPGA card is a generic purpose FPGA card that is ideal for interfacing with plenty of ADCs, DACs and several devices in the Medical Imaging domain. With an onboard LMK, high performance clocks can be generated to be used for various validation tests, and the 1-Gb onboard DDR3 provides abundant space for the data captured from the DUT EVMs to be stored. The Artix-7 FPGA use allows abundant lines for GPIOs, Clocks and Syncs that can be used on the DUT EVM for easier synchronization and automation during evaluation. It uses FX3 and USB Type-C interface that is extremely fast to reduce overhead times. All the control is done from the USB Type-C cable through the various DUT GUIs developed for evaluation.

TSWDC155 EVM has the following important features:

- High speed 7-series Artix FPGA (XC7A200T-3FBG484E)
- High speed communication between EVM and System through USB Type-C interface
- All programming done through USB Type-C cable
  - Both the FPGA and FX3 are programmed from system through the USB cable, avoiding the need for additional softwares, JTAG cables, and so on.
- Multiple LVDS lines for high speed data capture (1.2 Gbps, DDR) and device control
  - 36 pairs of LVDS lines brought out on the 400-pin FMC connector
  - 4 SPI buses available for DUT programming and control
- Option to install the PROM and SPI FLASH to burn the FX3 & FPGA firmwares into the EVM.
- Various CMOS lines as general purpose IOs and device control.
  - 6 CMOS SPI bus available for various devices
  - 36 lines available as GPIOs
- Features a high performance LMK04821
  - Used to generate clocks for FPGA as well as the DUT
- Features a 1-Gb on board DDR for storing the data captured from DUT
- Various SMA options and on board oscillators present to generate the clocks required for FPGA and the DUT
- With the DC-DC convertors on board, only a single external 5-V supply is required to power up the EVM

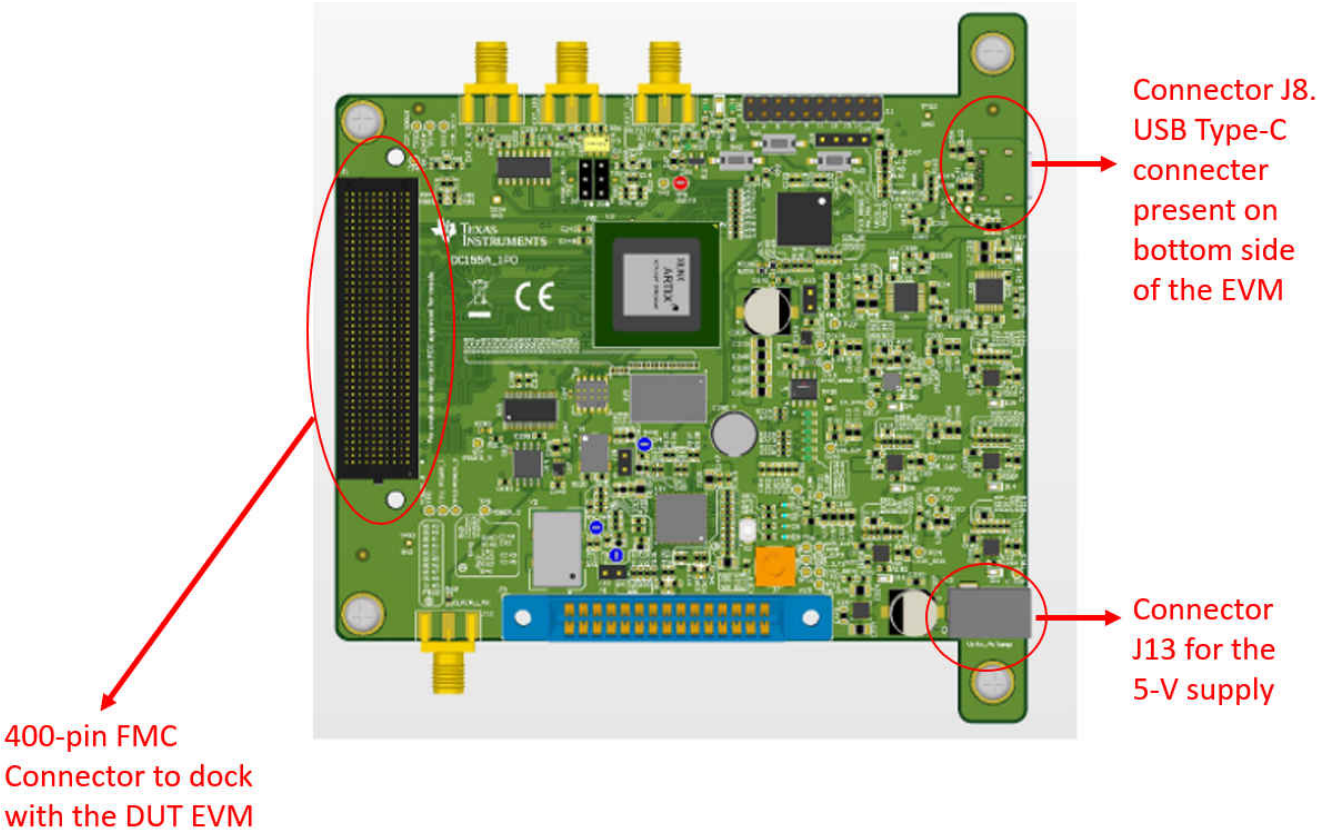
2 Block Level View of the EVM



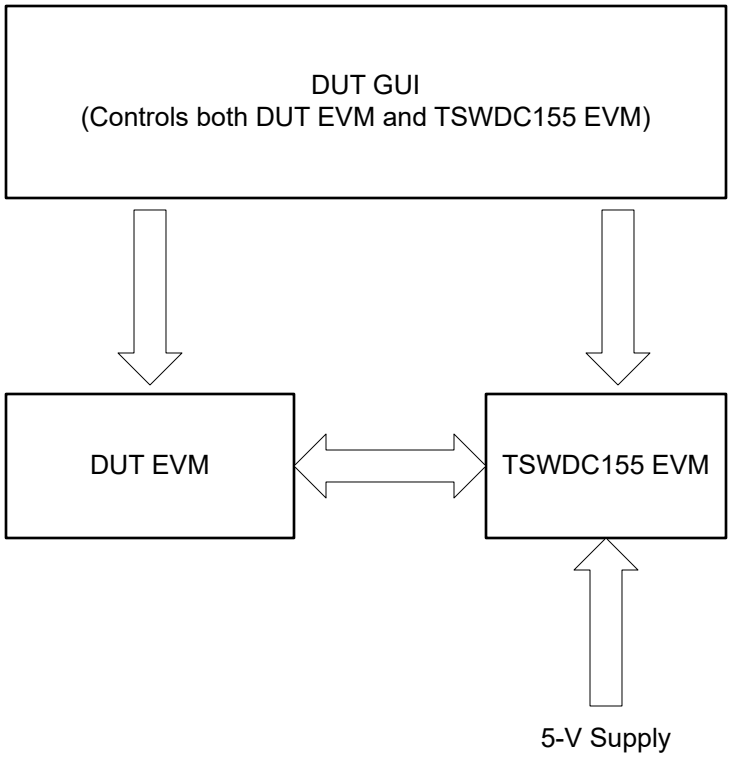
3 EVM Connection Details

Setting up the EVM Power Supply:

- Ensure that the power supplies are turned off before connecting to the board.
- Apply +5 V to connector J13 (set the current limit of the supply to around 1.2 A).
- EVM can be brought up and programmed with the DUT GUI. The details are in the following sections.



4 Setup Details



4.1 Power Supply

The EVM uses a single 5-V supply which can be powered through an adaptor. See Section 6 for more details.

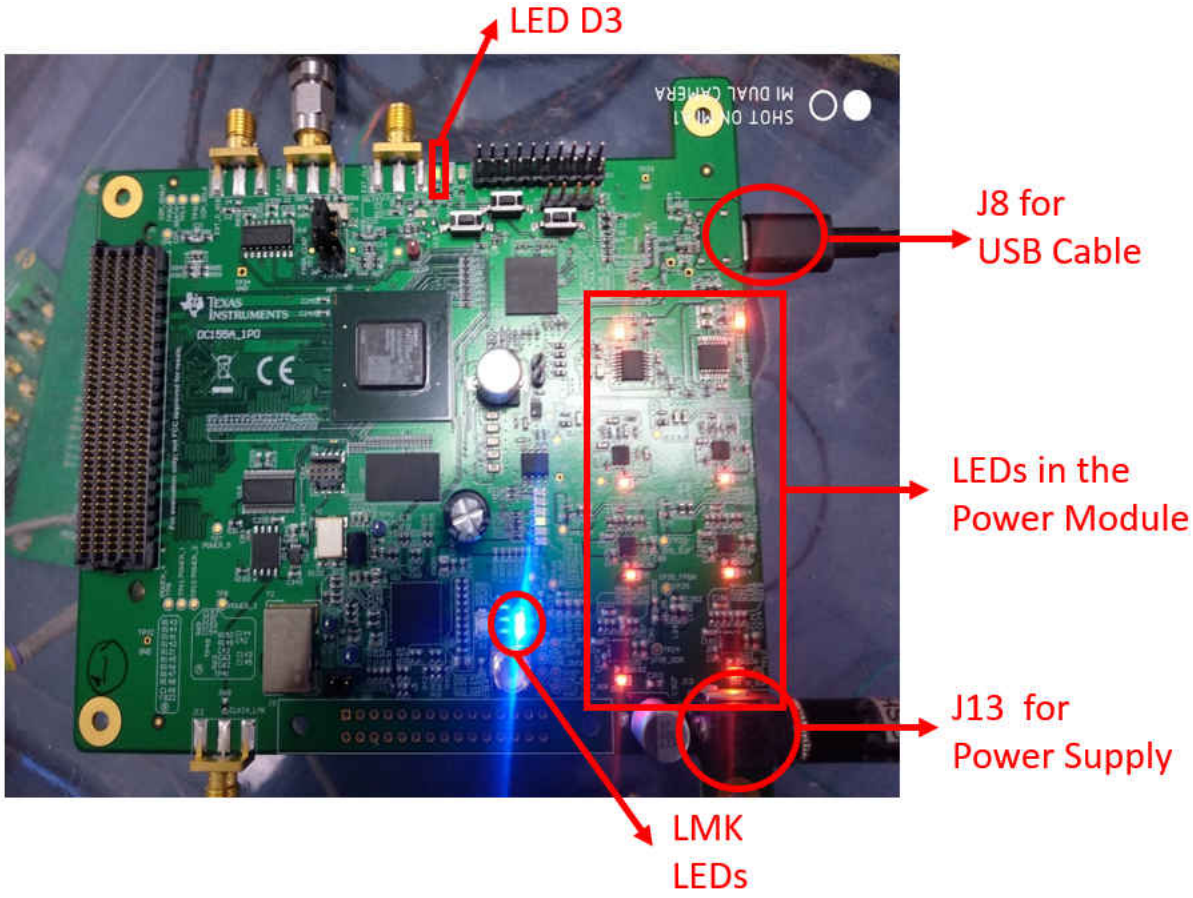
4.2 USB Interface to PC

A USB Type-C cable is used to interface the EVM with the System. See Section 6 for more details.

4.3 GUI

There is no standalone GUI for the TSWDC155 EVM. All the programming and capturing is done through the DUT EVM GUI to which the TSWDC155 EVM will be mated.

5 EVM Quick Start Status Check

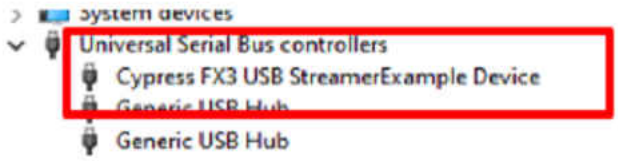


5.1 EVM Powerup

Connect the USB Type-C cable at J8 and the 5-V power supply at J13. Once the EVM is powered up through the GUI, all the 8 LEDs in the Power module box should start glowing.

5.2 FX3 Programming

After the FX3 is programmed through the GUI, in the USB section, a *Cypress Streamerexample Device* is seen. This indicates that the System-EVM link is established.



5.3 FPGA Programming

After the FPGA configuration is done through the GUI, the LED D3 should start to glow.

5.4 LMK Programming

After the LMK is programmed through the device GUI, the LMK LEDs shown in the previous slide should start to glow.

Note

The above 4 checks are to ensure that the EVM is in the proper working state for device validation.

6 Accessories Required for the EVM

6.1 5-V Supply Adaptor

- The EVM can be powered up with a power supply equipment that is a cylindrical jack cable.
- Alternatively, it can also be powered using a 5-V adaptor.
- This is one part TI recommends: SMI18-5-V-P5

6.2 USB Type-C Cable

A USB Type-C cable is required to interface the EVM with the system.

Some guidelines to follow while choosing the cable:

- Use shorter USB cable lengths. Keep the maximum length to 1.5 m.
- Avoid any HUBs between EVM and System.
- Avoid multiple USB devices / HUBs connected to the PC along with the EVM.
- This is one such cable TI recommends for interfacing the EVM:*CBL-UA-UC-1*

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265