

HA-EDA01X FPGA Module

Hardware User's Guide

Rev 1.0

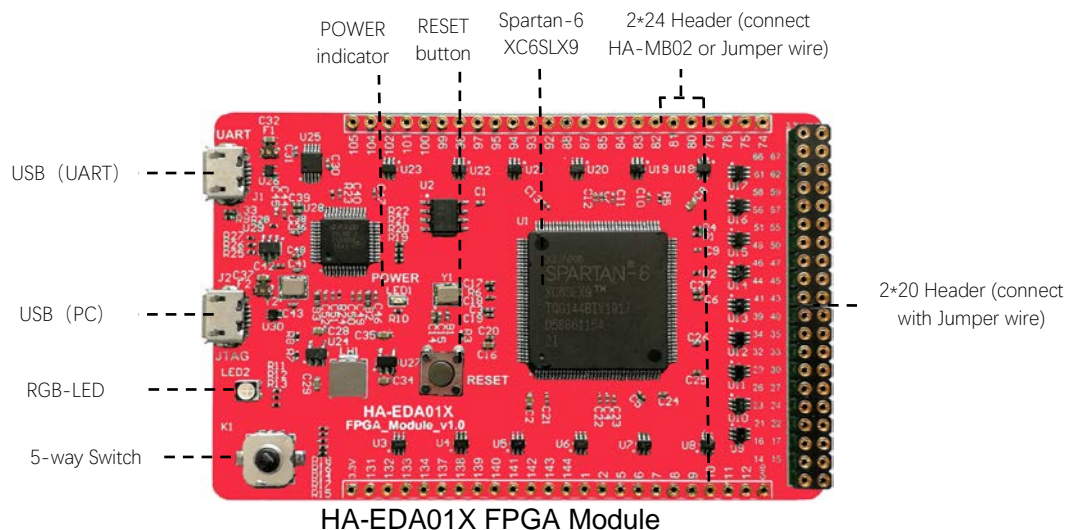
华清科仪（北京）科技有限公司
 **Huatsing Instruments**

1. Introduction

Thank you for choosing the HA-EDA01X FPGA Module of Huatsing Instruments(HI). HA-EDA01X FPGA Module is a compact FPGA board which is designed based on XC6SLX9 device. It's a low-cost and easy-to-use platform for learning Xilinx's Spartan-6 FPGA. This board includes integrated JTAG-HS1 circuitry for FPGA programming. Abundant I/Os are provided, you can easily connect a variety of peripherals using jumper wire or plug the module in HA-MB02 Digital Circuits Lab Platform. The pocket-sized dimension makes it a good choice for you when a FPGA core board is needed in your project. A USB to UART converter is integrated for easy data communication with PC. This guide will briefly describe the hardware modules on this board, so as to help you make better use of it.

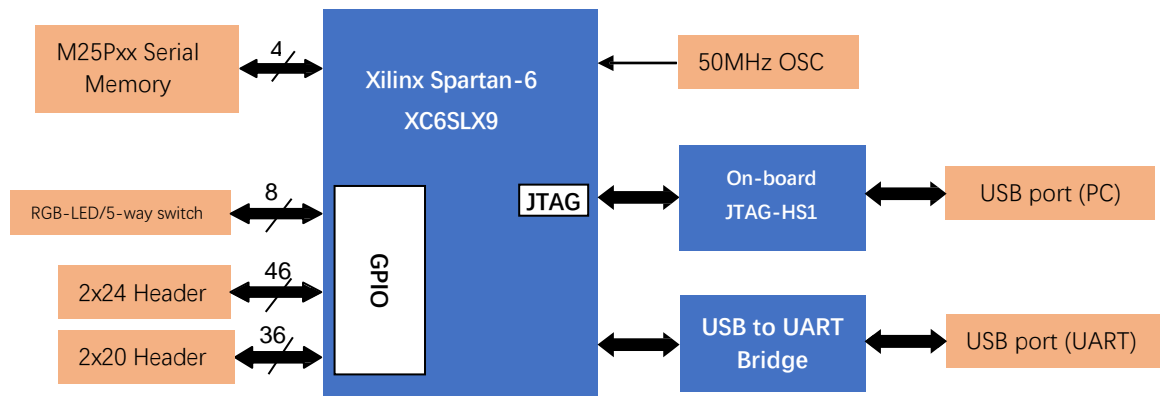
Features:

- Spartan-6 device—XC6SLX9
- USB to UART
- 88 expansion header (82 I/Os, +3.3V, GND)
- All I/Os with ESD chip protection
- RGB-LED & 5-way Switch
- On-board JTAG-HS1
- External serial configuration device: M25Pxx
- Reset pushbutton
- 50 MHz clock oscillator
- USB power supply
- Very compact board size: 87(mm) x 55(mm)



2. Hardware description

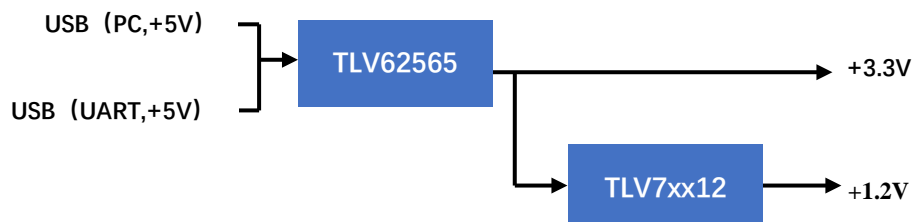
HA-EDA01X FPGA Module contains several parts that are easy to understand. The block diagram shown below depicts the architecture of this board.



HA-EDA01X FPGA Module Block Diagram

2.1. Power supply

HA-EDA01X FPGA Module could be powered with USB(PC) port(+5V DC, at least 500mA) or an external supply through USB(UART) port. One DC-DC is used to regulate down the input power to +3.3V, and one LDO is used to regulate down the +3.3V to +1.2V.



Note: Do not connect a power higher than +3.3V to any IOs of the board. This may accidentally damage the input capacitors.

2.2. FPGA Device

HA-EDA01X FPGA Module includes a Spartan-6 FPGA device—XC6SLX9 housed in a 144-Pin TQFP package. This device features higher amount of logic and memory resources compared to older Spartan devices. You can easily implement hardware multiple logic circuits on this device. MicroBlaze microcontroller is also supported. The table below has a overview of the resources for this device.

Spartan-6 LX FPGAs		XC6SLX9
Logic Cells		9,152
Memory (Kb)		576
DSP Slices		16
3.2 Gb/s Transceivers		-
Maximum I/O		200

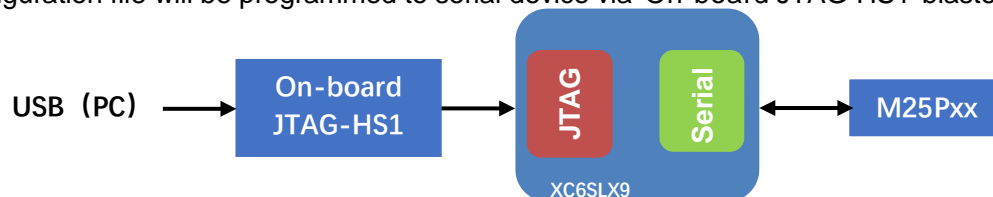
The table below shows the power pins connection for this device on HA-EDA01X FPGA Module.

Power Pins Connection

Power Pin Name	Power Rail	LDO
VCCO_0 ~ VCCO_3, VCCAUX	+3.3V	TLV62565
VCCINT	+1.2V	TLV7xx12

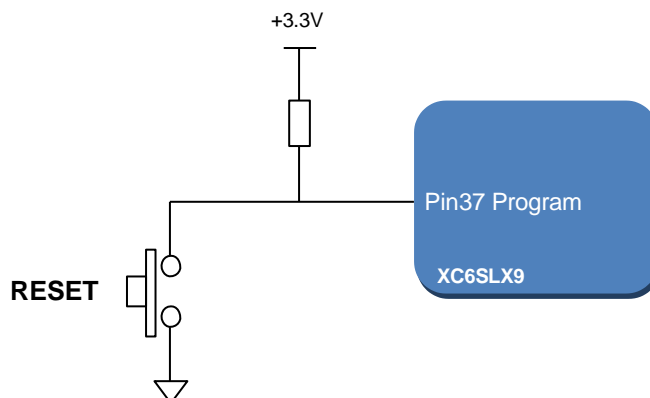
2.3. On-board JTAG-HS1 and External Serial Configuration Device

The internal SRAM of FPGA device could be programmed via On-board JTAG-HS1. A nonvolatile serial configuration device M25Pxx is assembled on this board. The configuration file will be programmed to serial device via On-board JTAG-HS1 blaster.



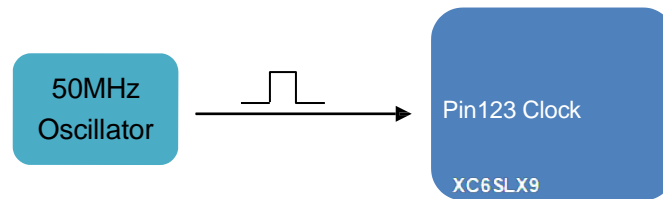
2.4. Reset Button

A Reset pushbutton is available on HA-EDA01X FPGA Module. This button is useful when you want to reinitialized the module. It force the FPGA device to reload configuration file from external serial device.



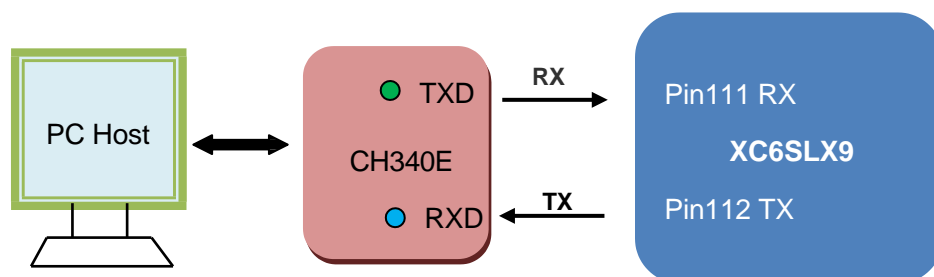
2.5. Clock Oscillator

HA-EDA01X FPGA Module includes one 50MHz clock oscillator. It can be used as a global clock source or drive the internal PLL of FPGA device.



2.6. USB to UART Bridge

Serial communication can be easily implemented and is widely used when data exchange is needed between PC and peripherals. Since most new generation PCs are not assembled with an older 9-Pin D-Sub serial port. But USB port is abundant. The USB to UART converter IC solves the problem while retaining the advantage of serial port. CH340E is used in this board to play a role of USB to UART converter.



2.7. RGB-LED

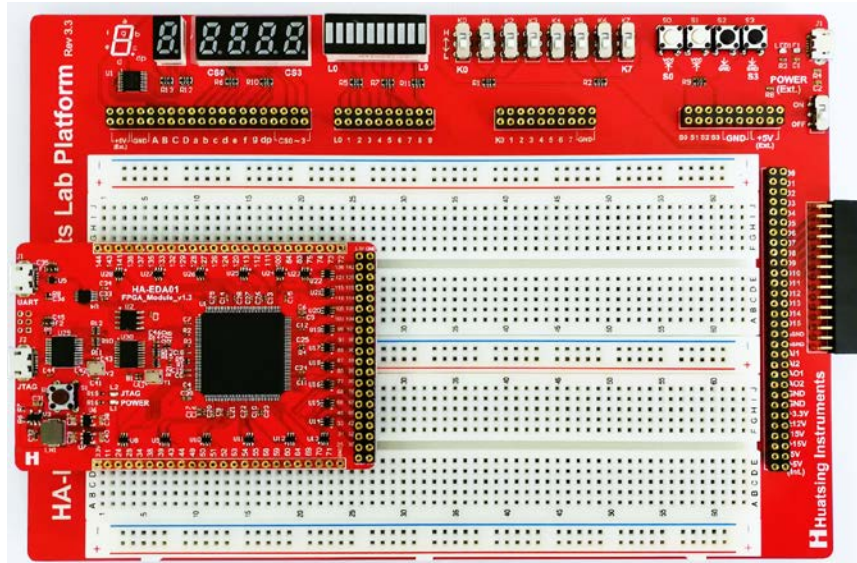
There is a RGB-LED on the board, and XC6SLX9's 3 IOs control the Red-Green-Blue independent colors: R-Pin119, G-Pin118, B-Pin117. See Schematics.

2.8. 5-way Switch

There is a 5-way Switch on the board, and XC6SLX9's 5 IOs control the 5 ways: A-Pin124, B-Pin121, C-Pin120, D-Pin126, Center-Pin127. See Schematics.

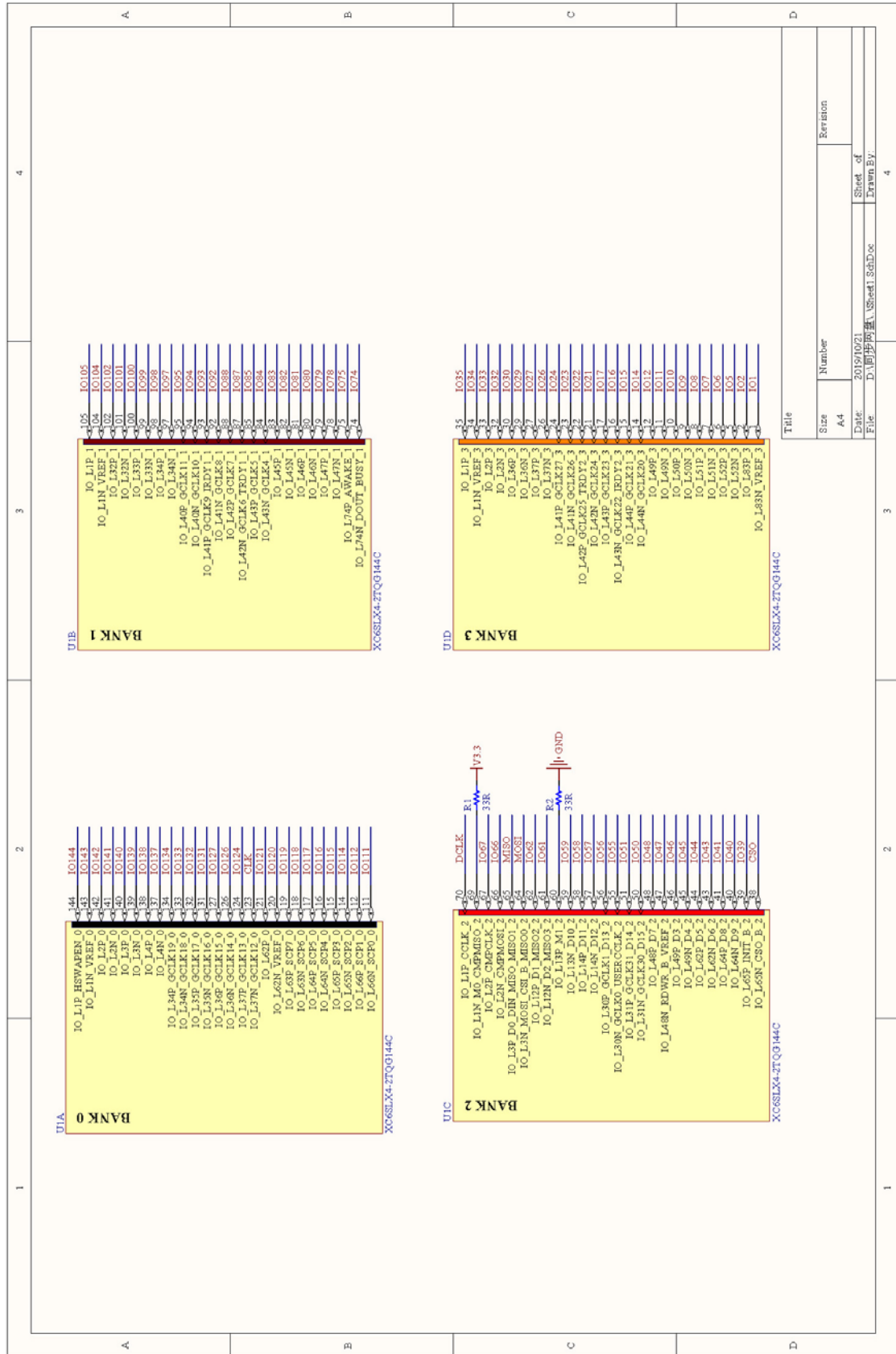
2.9. Expansion Header

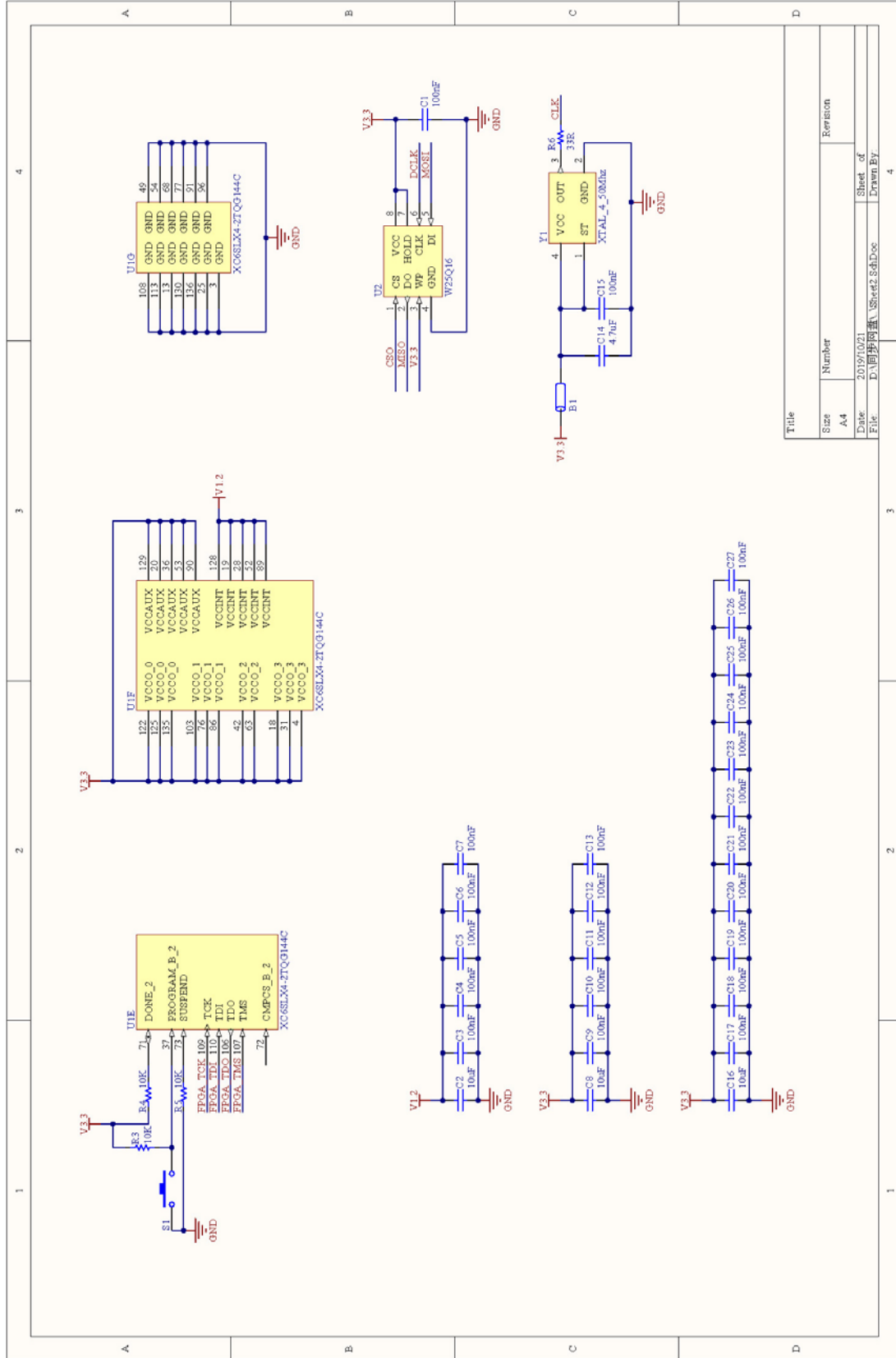
Two groups of expansion header are available. 2x24 header includes 46 I/Os and +3.3V power supply, can connect with HA-MB01 or Jumper wire. 2x20 header includes 36 I/Os and +3.3V power supply, can only connect with Jumper wire.



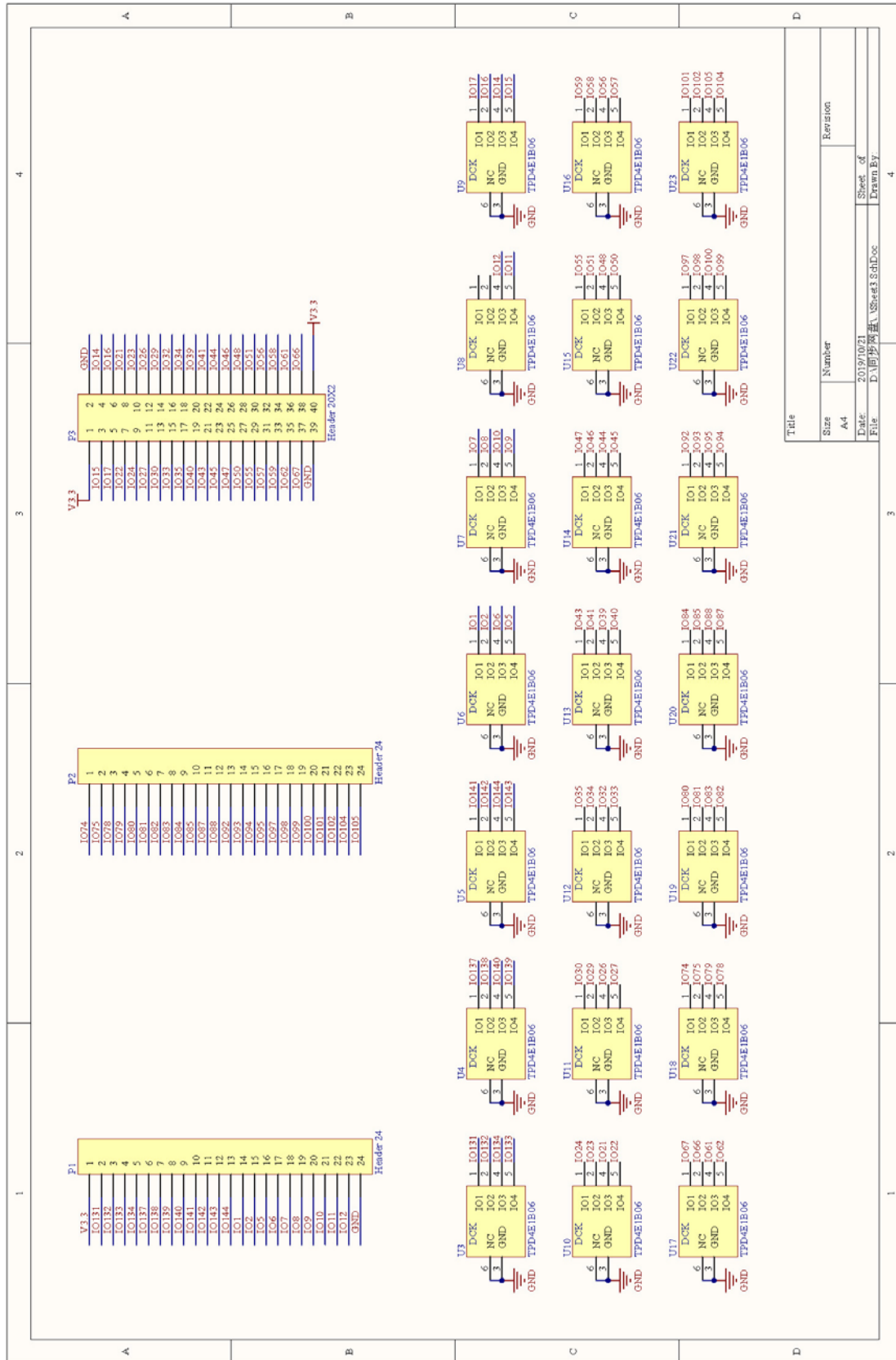
HA-EDA01X FPGA Module plug on HA-MB02 Digital Circuits Lab Platform with 2x24 Header

3. Schematics

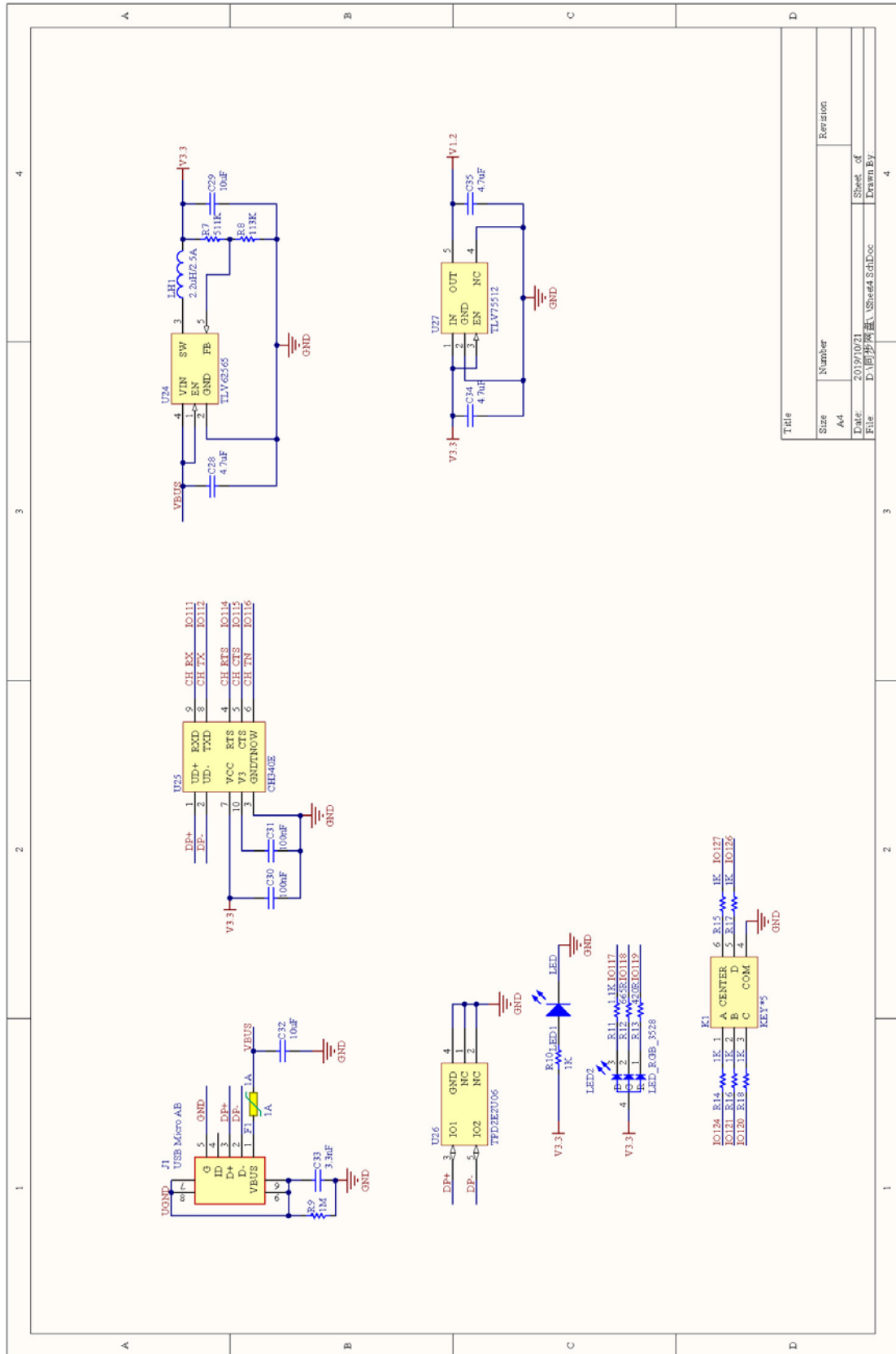




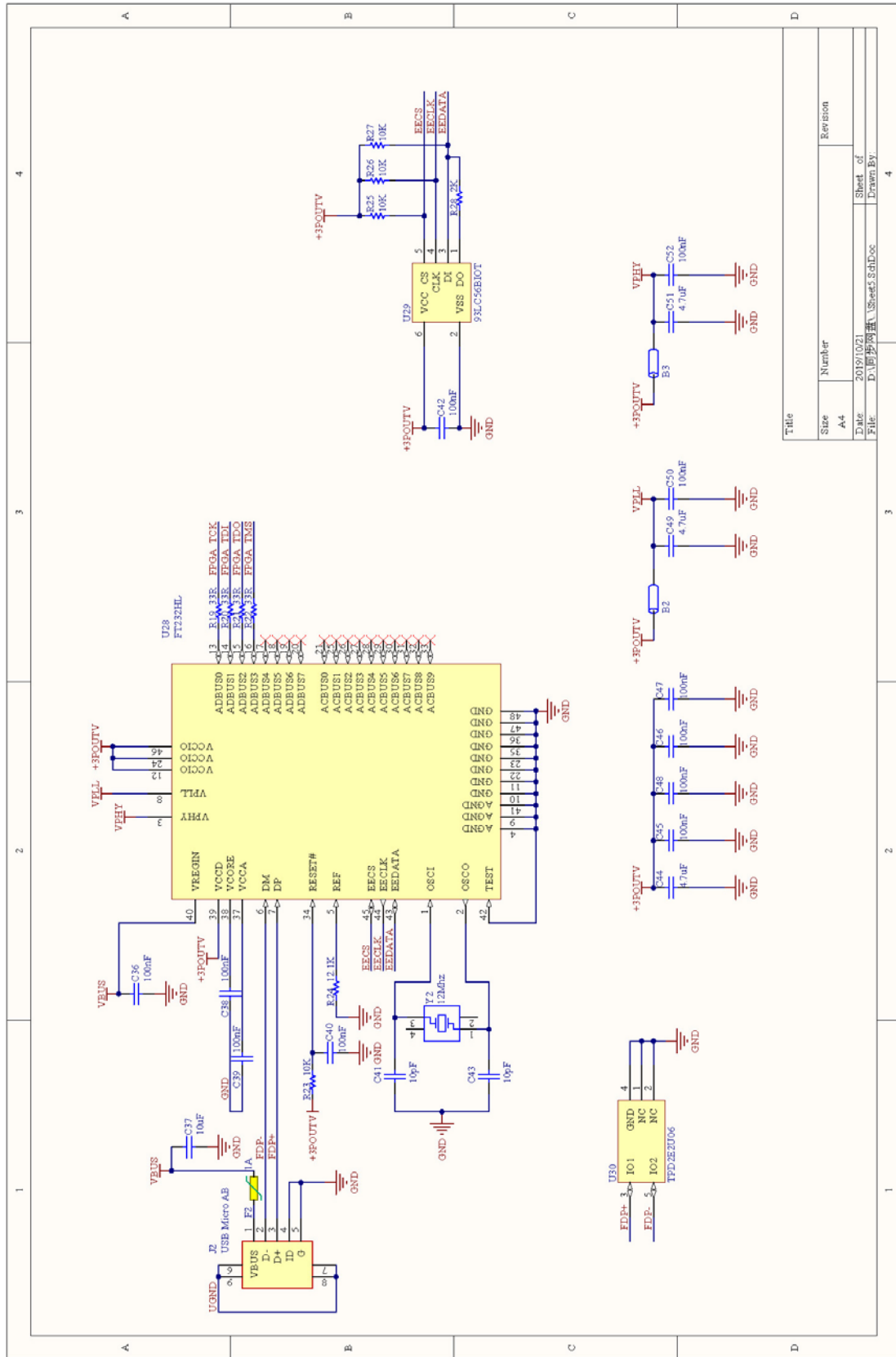
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