



ABSTRACT

How to use and configure the TDP0604 EVM along with recommendations for system hardware implementation is described in this document. These recommendations are only guidelines and it is the designer's responsibility to consider all system characteristics and requirements. Engineers should refer to the data sheet for technical details such as device operation, terminal description, and so forth.

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1 Overview

1.1 What is the TDP0604 EVM?

The TDP0604 EVM is a PCB created to help for customers evaluate the TDP0604 for video applications with HDMI interfaces. This EVM can also be used as a hardware reference design for implementations of the TDP0604. PCB design or layout files can be provided upon request to provide PCB design illustrations of the routing or placement rules with a TDP0604 component.

1.2 What is Included in the TDP0604 EVM?

The major components of the EVM are as below:

- TDP0604 device
- Standard HDMI source connector (receptacle)
- Standard HDMI sink connector (receptacle)
- DC power regulators
- I2C programming interface for external I2C host connections
- USB interface
- Headers for configuring various TDP0604 features

1.3 What Does the EVM Look Like?

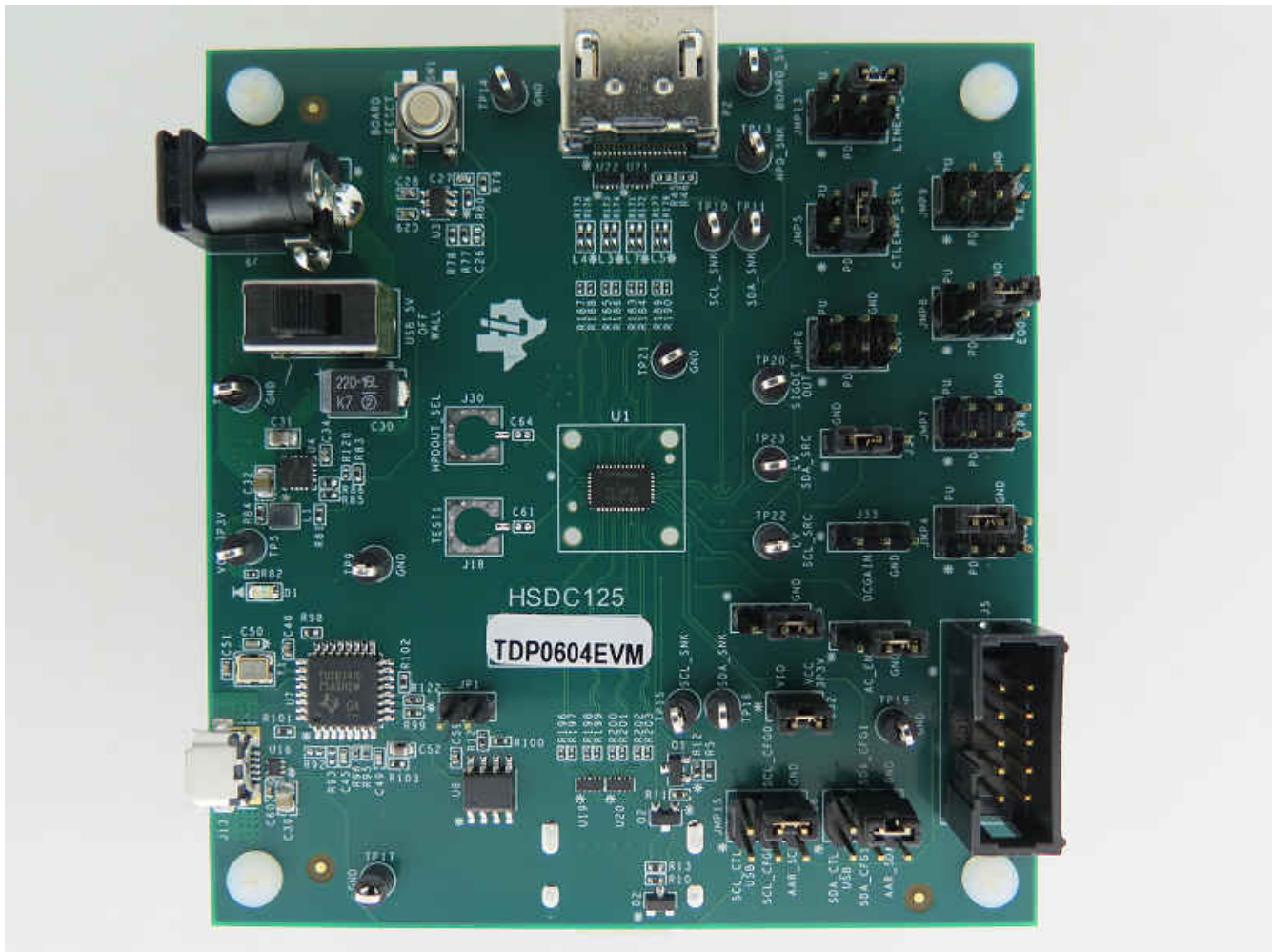


Figure 1-1. EVM Board

2 Hardware Configuration

2.1 Power

A DC barrel jack (J9) to accept a 5-V wall power adapter is provided on the EVM. The DC barrel jack (CUI Inc. PJ-202AH) has an inner diameter of 2.1 mm and an outer diameter of 5.5 mm. The tip of the +5 V power supply must be positive. A +5 V power supply of at least 1.5 amps that meets the above requirements can be used to power the TDP0604 EVM. Power is provided to the EVM when SW2 is set to position 1.

Alternately, it is possible to power the EVM by connecting a USB Micro cable from a host to the J13 USB Micro B connector and setting SW2 to position 3.

Note

Limit VBUS voltage and voltage from barrel jack to no more than 6 V.

2.2 Enable or Reset

There are three device enable or reset options to use with the EVM.

1. Supervisor circuitry option. This is the default configuration on the EVM. The enable (EN) signal is held low until the power good (REG_PG) from the 3.3 V voltage regulator reaches a stable high voltage level then released high.
2. RC timing option. C26 external capacitor and internal resistor are used to control the EN pin ramp time after device is powered on. C26 is a DNI (*Do Not Install* option) by default. C26 needs to be installed and R77 needs to be uninstalled to enable this option.
3. External control option. A push button (SW1) is provided to manual control of the EN pin.

2.3 Configuration Jumpers

Multiple jumpers are provided on the EVM for configuration of TDP0604 and also for probe points.

The following is a list of 4-level jumpers which are used to configure the TDP0604: JMP4, JMP5, JMP6, JMP7, JMP8, JMP9, and JMP13. The jumper position to select between the different levels is detailed in [Table 2-1](#).

Note

4-level pins are sampled after the rising edge of EN pin. Therefore, a change in any 4-level pin state will not be applied until after EN pin is toggled from low to high.

Table 2-1. 4-Level Configuration Jumper Settings

Jumper Position	4-Level State
Short 4 to 6	0
Short 3 to 4	R
Open	F
Short 2 to 4	1

Table 2-2. Jumpers

Jumper	Default Position	Description
JMP4	Short 4 to 6	MODE. Default is pin-strap mode. If I2C mode is desired, leave this jumper open or no-connect. Refer to data sheet for more details.
JMP5	Short 3 to 4	CTLEMAP_SEL. Refer to data sheet for details on different CTLEMAP options.
JMP6	Open	EQ1. In pin-strap mode, this jumper along with JMP8 (EQ0) will select the EQ value for the receiver. The EQ may need to be tuned based on quality of HDMI cable used. Refer to data sheet for details on EQ options.
JMP7	Open	TXPRE. Refer to data sheet for details.
JMP8	Short 4 to 6	EQ0/ADDR. In pin-strap mode, this jumper along with JMP6 (EQ1) will select the EQ value for the receiver. The EQ may need to be tuned based on quality of HDMI cable used. Refer to data sheet for details.
JMP9	Open	TXSWG. Refer to data sheet for details.
JMP13	Short 4 to 6	LINEAR_EN. Refer to data sheet for details.

Table 2-2. Jumpers (continued)

Jumper	Default Position	Description
JMP15	Short 4 to 6	SCL and CFG0. Short 1 to 3: I2C clock from TUSB3410 (U7). Short 3 to 5: I2C clock from Aardvark connector (J5). Short 2 to 4: CFG0 pulled up to VIO (3.3 V). Refer to data sheet for details on CFG0. Short 4 to 6: CFG0 pull-down to GND. Refer to data sheet for details on CFG0.
JMP16	Short 4 to 6	SDA and CFG1. Short 1 to 3: I2C data from TUSB3410 (U7). Short 3 to 5: I2C data from Aardvark connector (J5). Short 2 to 4: CFG1 pulled up to VIO (3.3 V). Refer to data sheet for details on CFG1. Short 4 to 6: CFG1 pull-down to GND. Refer to data sheet for details on CFG1.
J25	Short 2 to 3	HPDOUT_SEL. Short 1 to 2: HPD_OUT is open drain. Short 2 to 3: HPD_OUT is push-pull.
J27	Short 2 to 3	AC_EN Short 1 to 2: OUT_D[2:0] and OUT_CLK is AC-coupled. Make sure R171, R172, R173, R174, R175, R176, R177, and R178 are populated with 100 nF capacitor or make sure AC capacitor is external to EVM board. Short 2 to 3: OUT_D[2:0] and OUT_CLK is DC-coupled. Make sure R171, R172, R173, R174, R175, R176, R177, and R178 are populated with 0-Ω resistor.
J31	Short 2 to 3	DDC Level Shifter enable/disable Short 1 to 2: Discrete DDC level shifter (U23) disabled. Short 2 to 3: Discrete DDC level shifter (U23) enabled.
J32	Short 1 to 2	VIO Voltage. Short 1 to 2: VIO connected to board 3.3 V. OPEN: VIO is from an external supply.

2.4 Rx EQ Configuration

There are sixteen EQ settings with 0 being the lowest and Fh being the highest. Refer to data sheet for specific EQ value.

Table 2-3. Rx Equalization Control

Register(s): CLK_EQ, D0_EQ, D1_EQ, D2_EQ Equalization Setting #	EQ1 PIN Level	EQ0 PIN Level	EQ Gain
0	0	0	Lowest EQ setting.
1	0	R	
2	0	F	
3	0	1	
4	R	0	
5	R	R	
6	R	F	
7	R	1	
8	F	0	
9	F	R	
10	F	F	
11	F	1	
12	1	0	
13	1	R	
14	1	F	
15	1	1	Highest EQ setting

2.5 HPD Snoop Option

To accommodate systems that do not properly resend DDC commands after HPD goes low, we have implemented an HPD snoop mode on the TDP0604 EVM. This mode allows the HPD line to be routed around the TDP0604, but remain connected to the TDP0604 on the sink side to allow the TDP0604 to snoop its state.

- Populate R131, no populate R129 for HPD on.
- No populate R131, populate R129 for HPD snoop-only

2.6 Local I2C Access

Access to TDP0604s local I2C signals is provided through the J5 connector. The TDP0604 supports either 1.2 V, 1.8 V and 3.3 V LVCMOS levels. The TDP0604 VIO pin is used to select which voltage level is used for the following 2-level control pins: LV_DDC_SDA, LV_DDC_SCL, SCL/CFG0, and SDA/CFG1. It is important that the I2C signalling levels meet the TDP0604 LVCMOS levels when I2C interface is accessed through the connector.

A standalone external I2C host can be connected through J5 for debug and control purposes. An example of an external I2C Host controller is the Total Phase Aardvark I2C/SPI Host Adapter (Total Phase Part#: TP240141). Sample scripts for this I2C host controller are provided by request.

The target I2C address for the TDP0604 can be modified by the EVM jumper JMP8. Please refer to the TDP0604 ADR/EQ pin setting and its corresponding I2C address. Refer to TDP0604 data sheet for the 7-bit I2C target address options.

Table 2-4. Aardvark I2C (J5) Pinout

J5 pin #	Description	J5 pin #	Description
1	SCL_CTL	2	GND
3	SDA_CTL	4	NC
5	NC	6	NC
7	NC	8	NC
9	NC	10	GND

3 Quick Start Guide

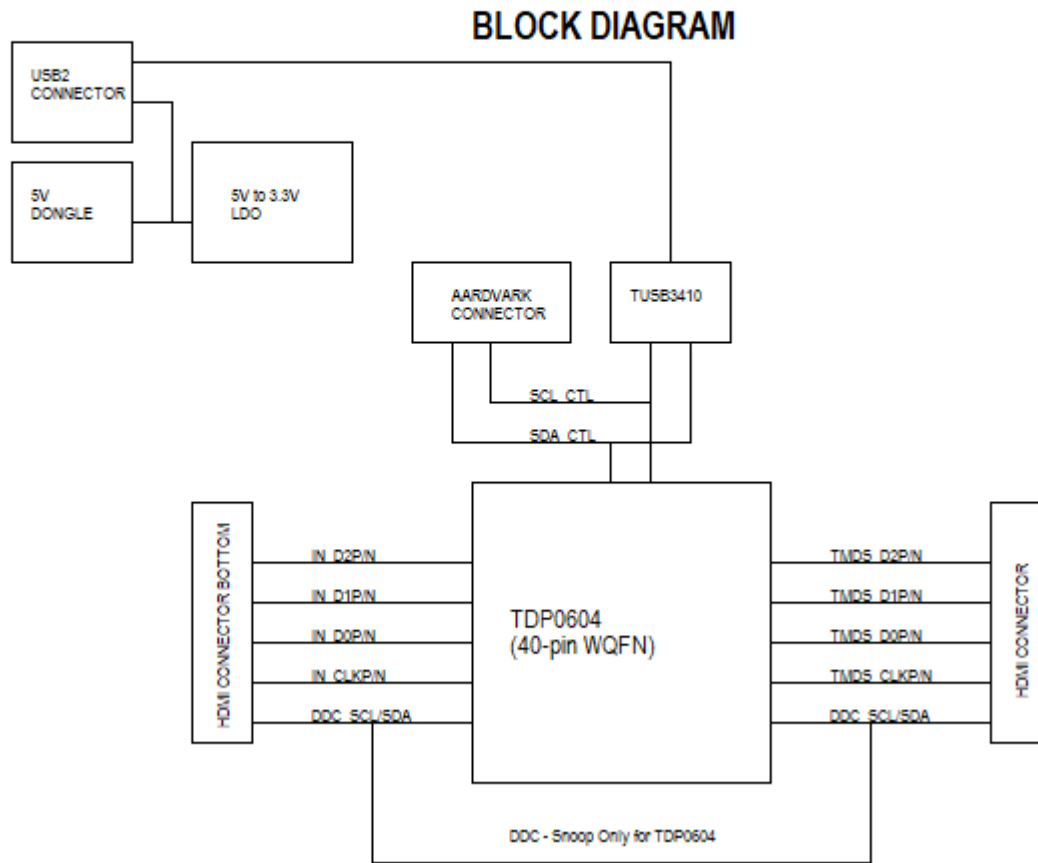
The instructions below assume the EVM is configured for pin-strap mode and is powered from barrel jack.

1. Insertion +5 V DC Power source into barrel jack. Turn on SW2.
2. If using external I2C configuration instead of pin-straps, please configure TDP0604 at this step.
3. Insert a HDMI source using a standard HDMI cable into P1 (HDMI receptacle).
4. Insert a HDMI video sink into P2 (HDMI receptacle) using a standard HDMI cable.
5. Video output on HDMI sink should be observed.

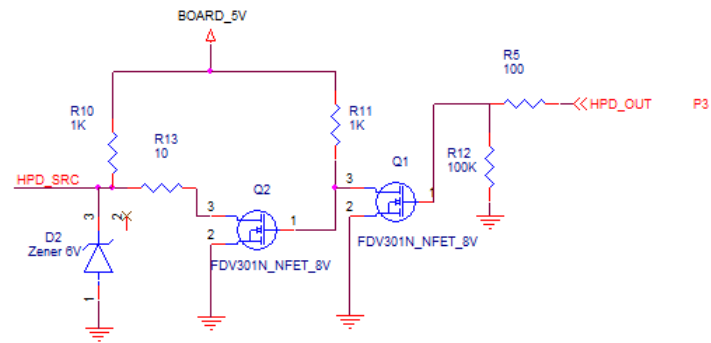
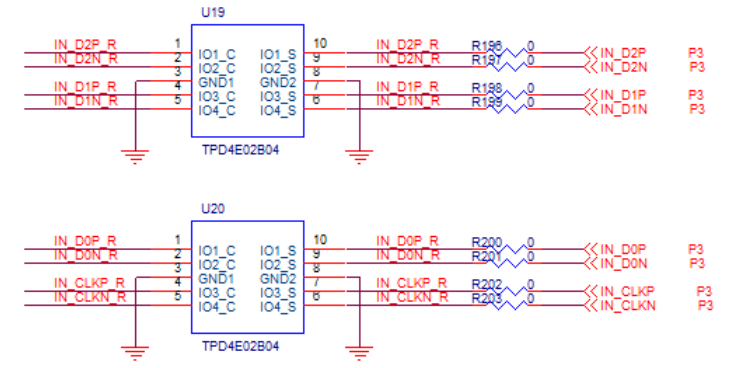
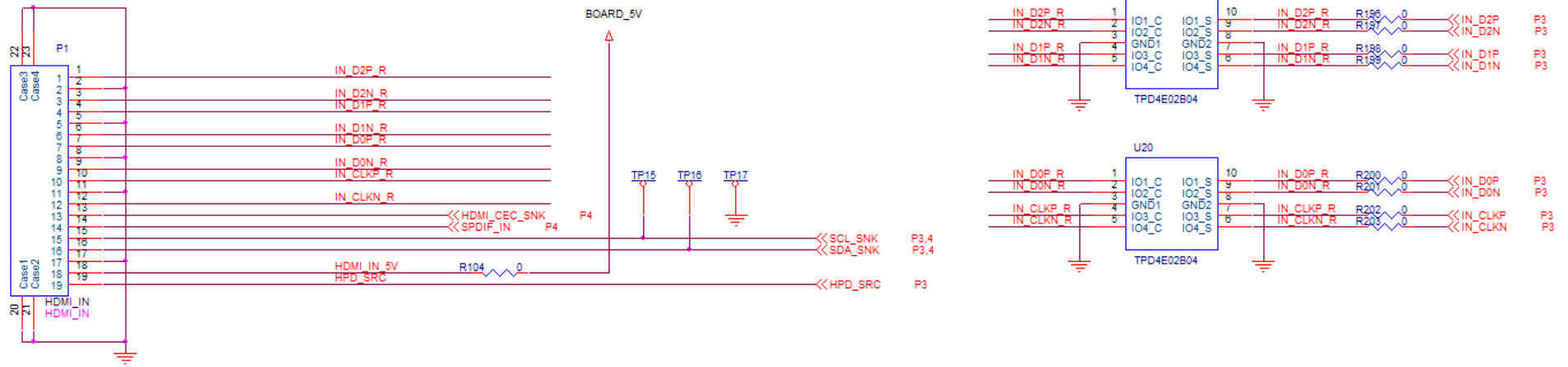
4 Schematics

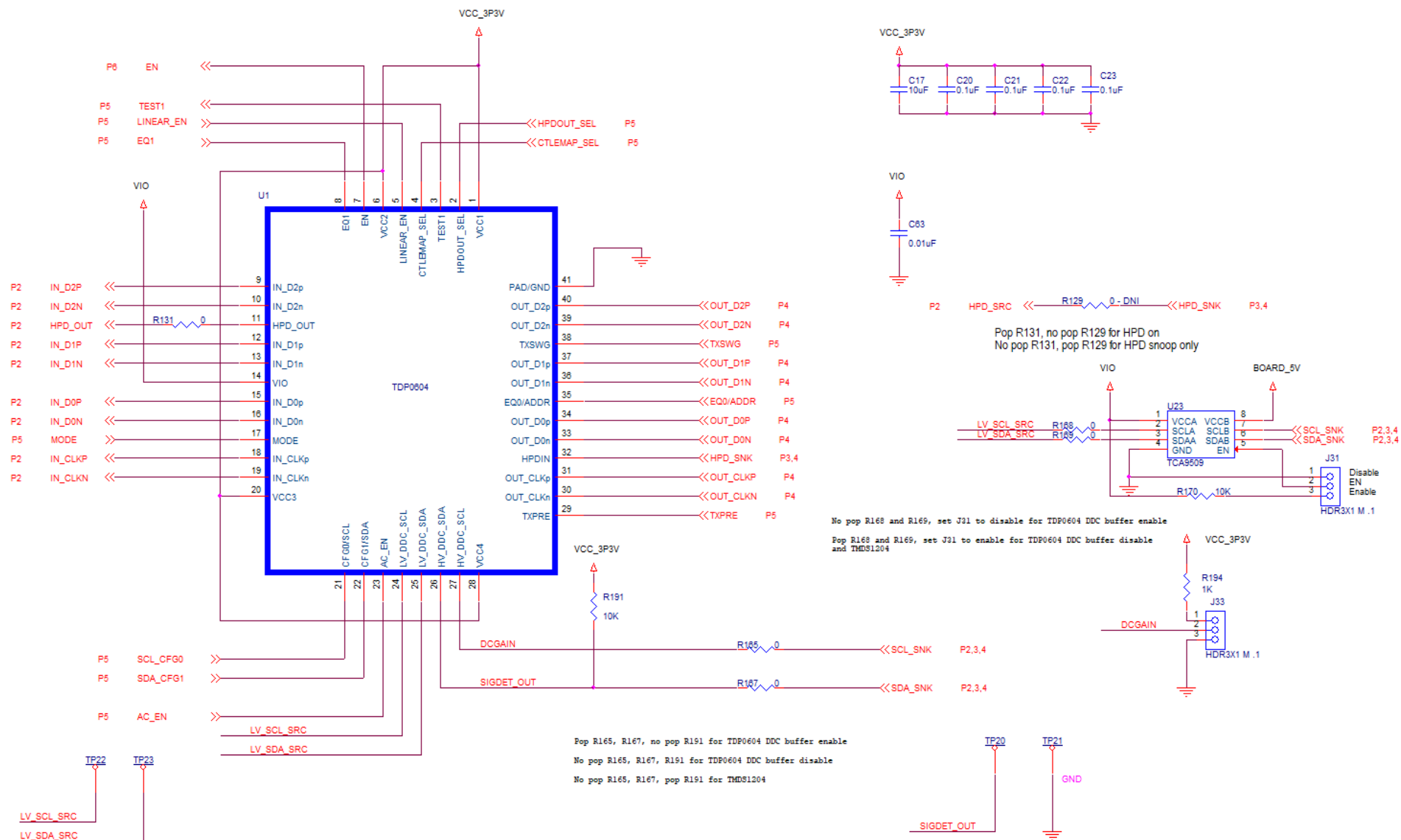
NOTES:

- 100-ohm differential impedance for HDMI differential pairs.

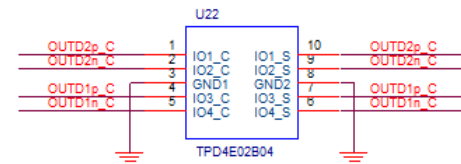
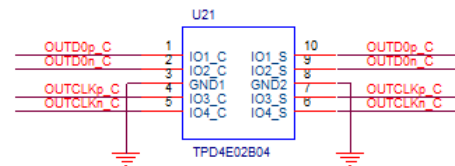
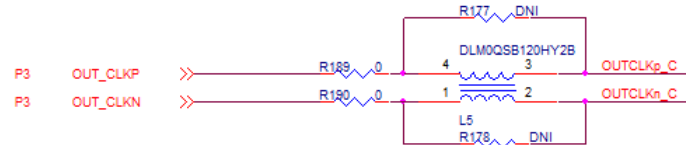
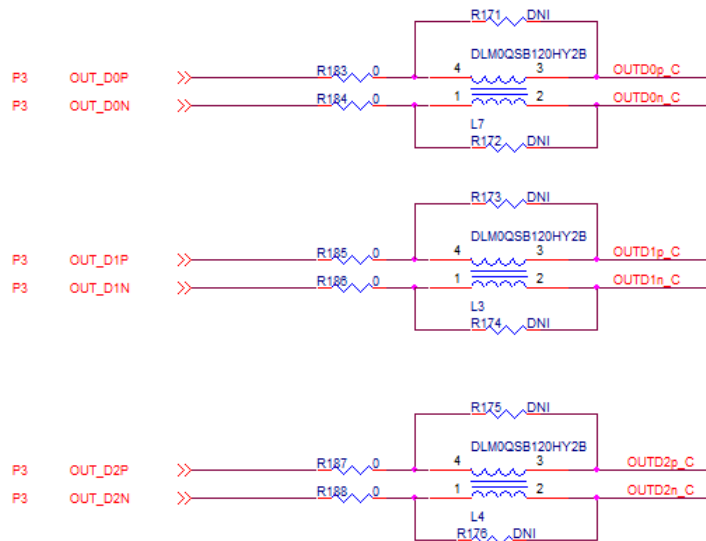
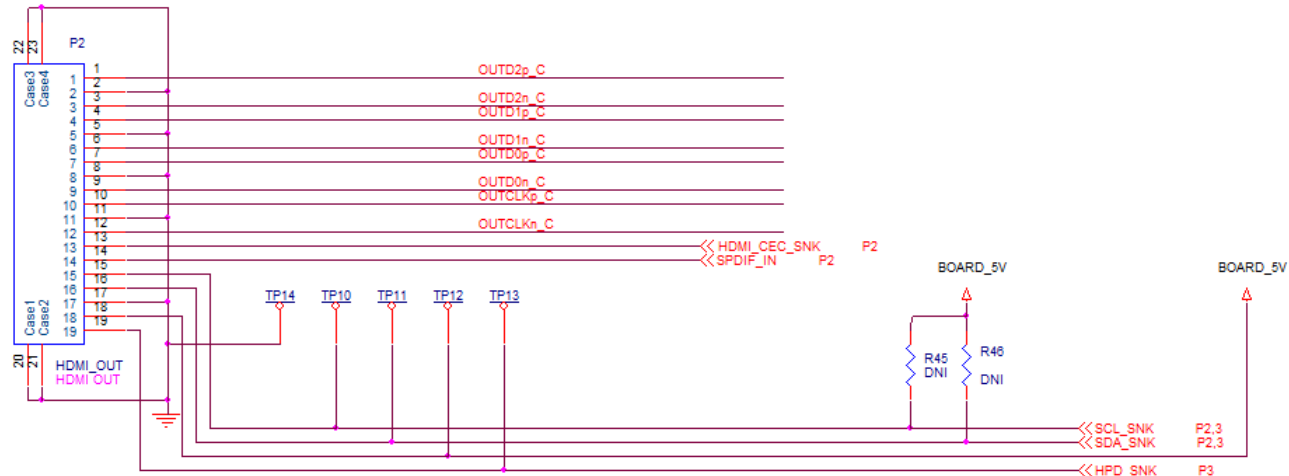


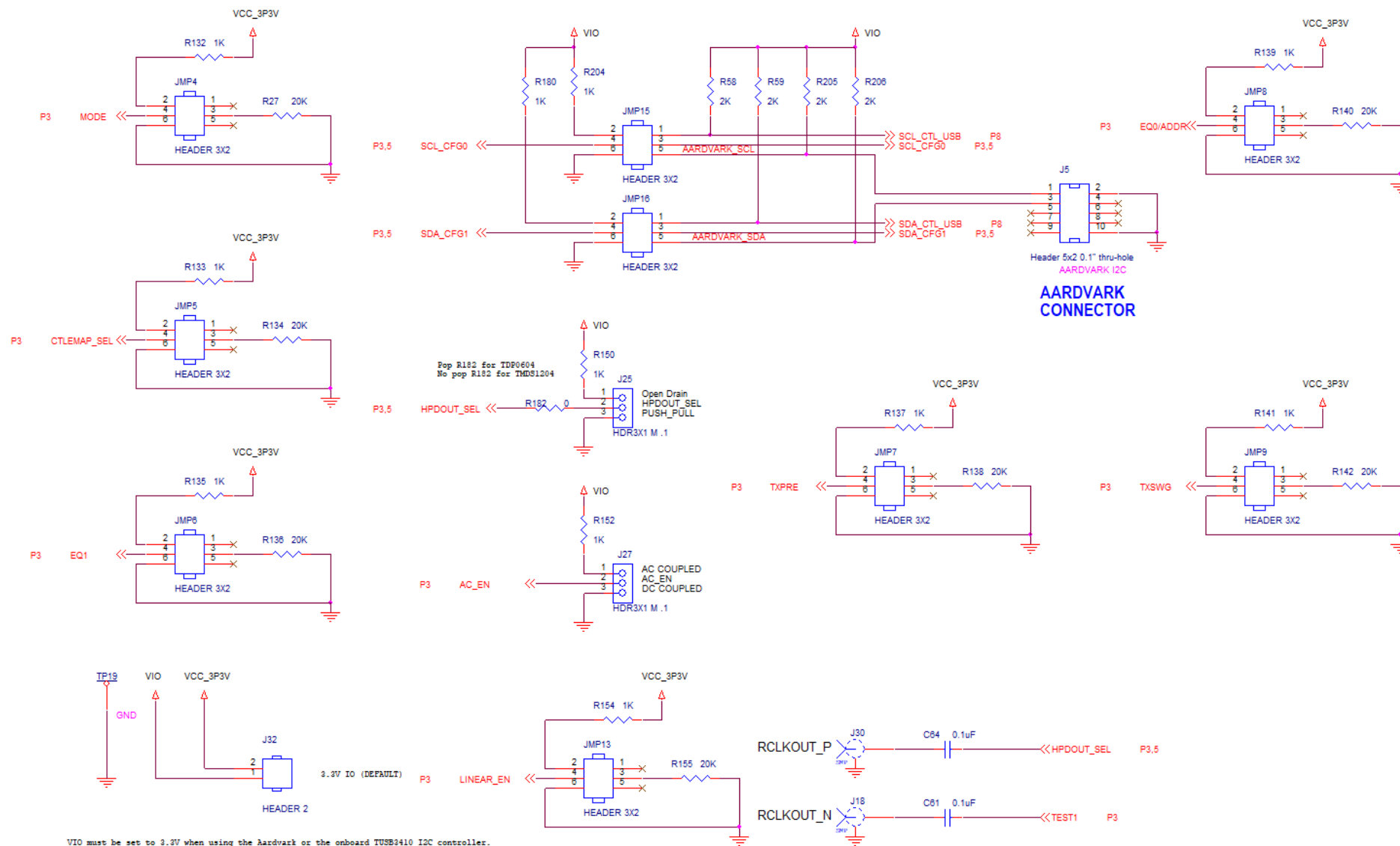
HDMI RX

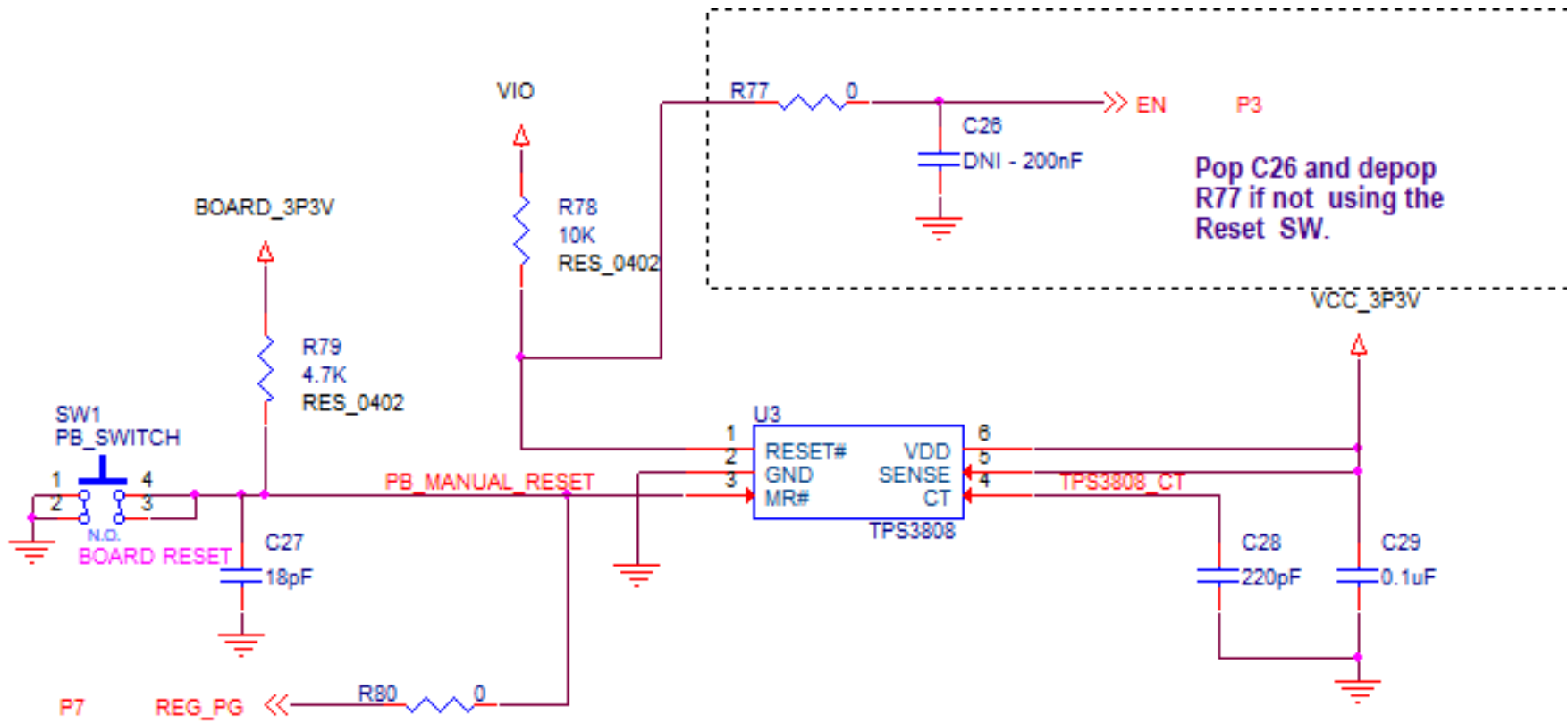


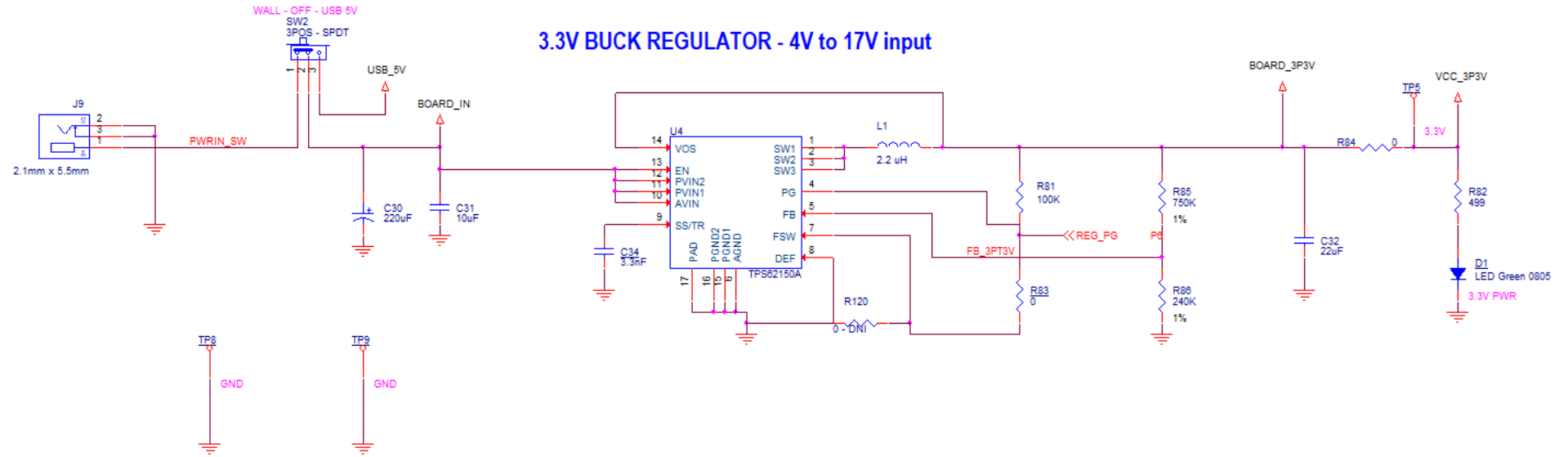


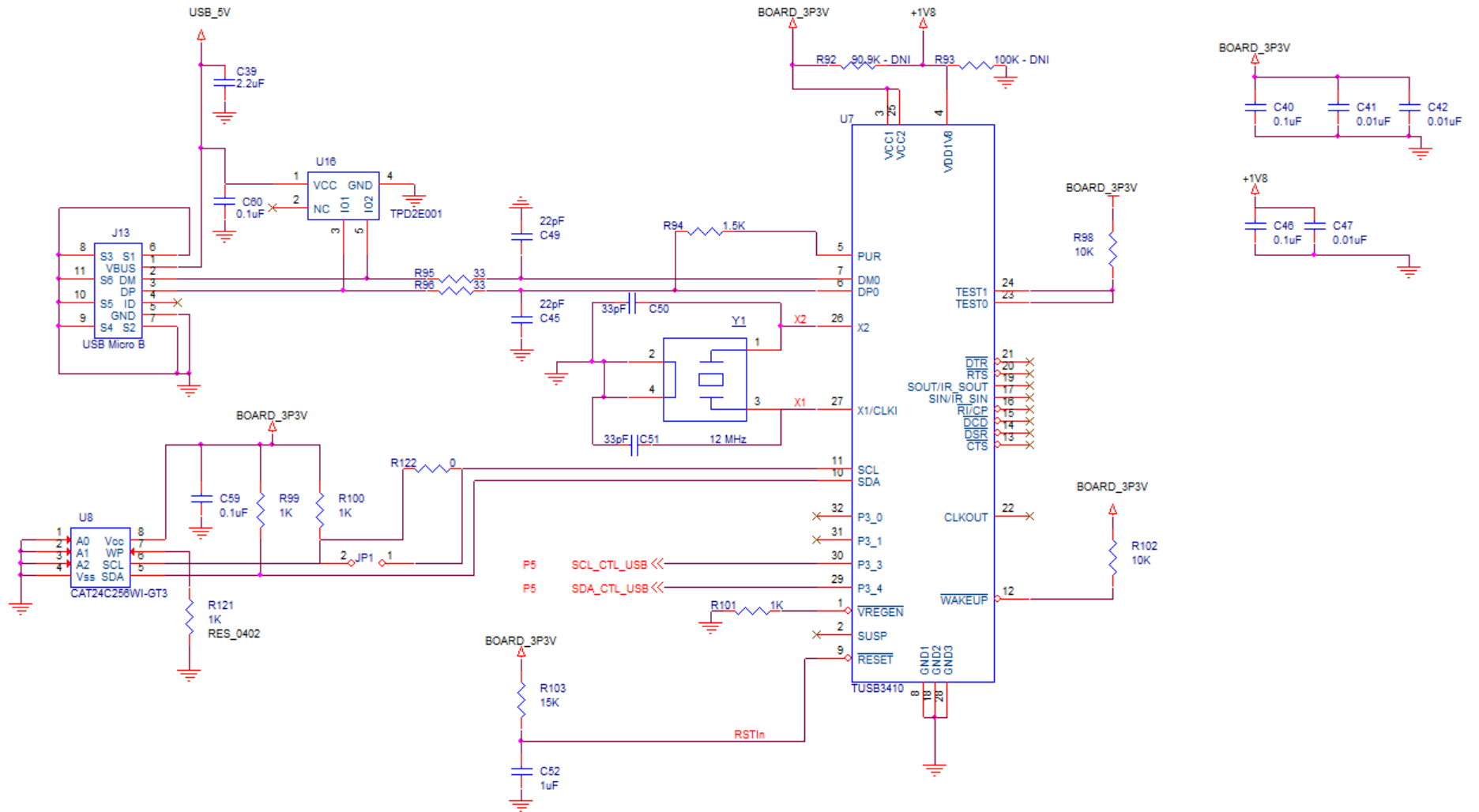
HDMI TX











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