User's Guide

DP83TC812EVM-MC User's Guide

ABSTRACT

This User's Guide discusses how to properly operate and configure the DP83TC812 Media Converter EVM. For best layout practices, schematic files, and Bill of Materials, see the associated support documents.

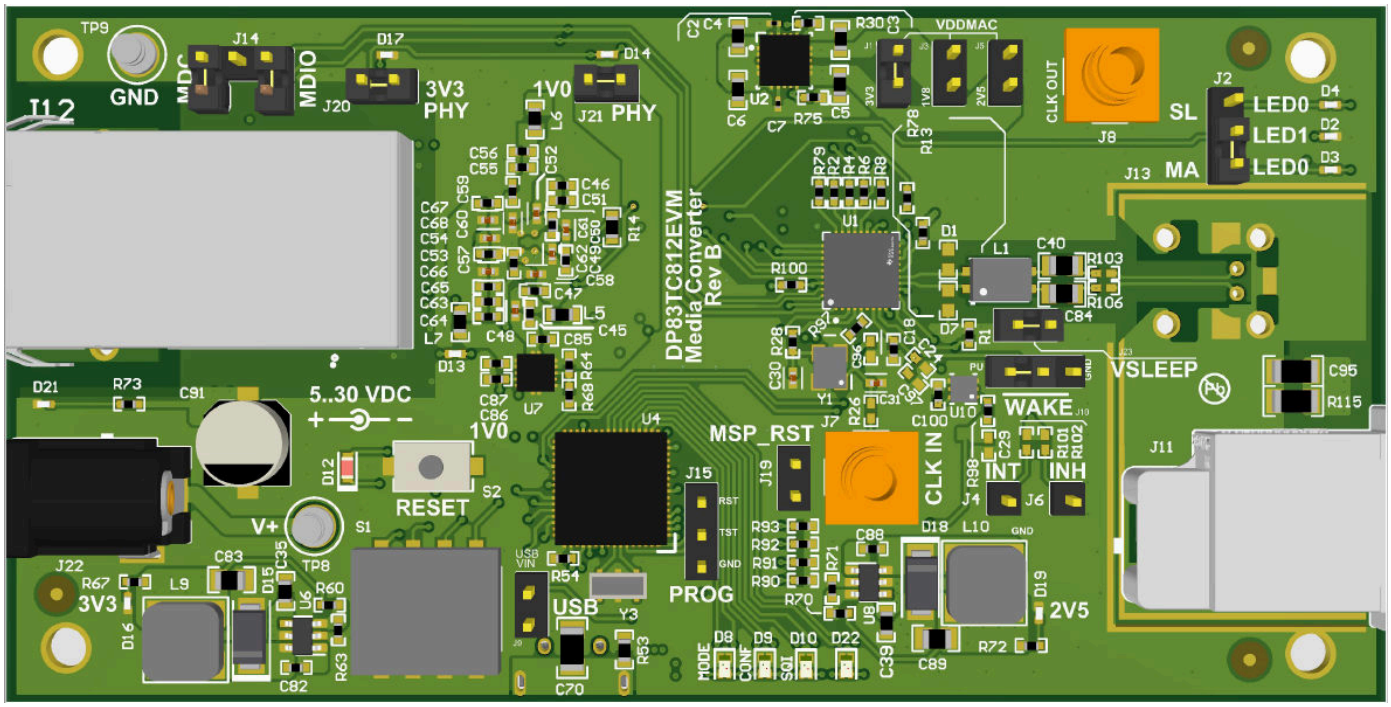

Figure 1-1. DP83TC812EVM-MC

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List of Figures

1 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (November 2020) to Revision A (March 2022)	Page
• Updated EVM User Guide throughout to reflect new board	3

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2 Introduction

The DP83TC812EVM-MC supports 100-Mbps speed and is IEEE 802.3bw compliant. There is an on-board MSP430F5528 for use with the USB2MDIO graphical user interface tool. DP83867 is provided for copper (100BASE-TX) support using RGMII MAC Interface.

2.1 Key Features

- Media Converter: 100BASE-T1 to 100BASE-TX
- IEEE802.3bw Compliant
- IEEE802.3u Compliant
- RGMII Back-to-Back Configuration
- On-board MSP430F5528
  - USB-2-MDIO Support
- Status LEDs
  - DP83TC812
    - Link
    - Link + Activity
  - DP83822
    - Link (RJ-45)
  - Power-on Indicator (D21, D16, D17, D14, D19, D13)
  - SMI Command
- Variable VDDMAC Voltage Range: 1.8 V, 2.5 V, and 3.3 V

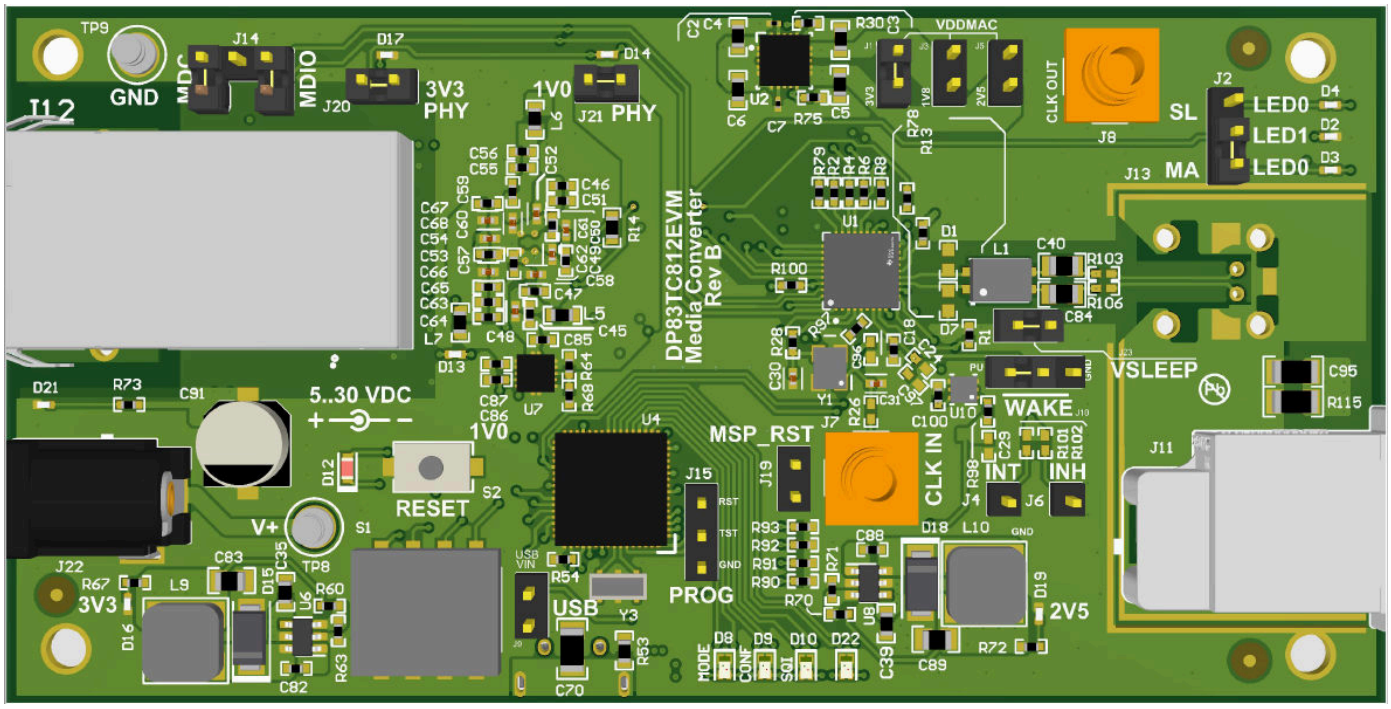


Figure 2-1. DP83TC812EVM-MC – Top Side

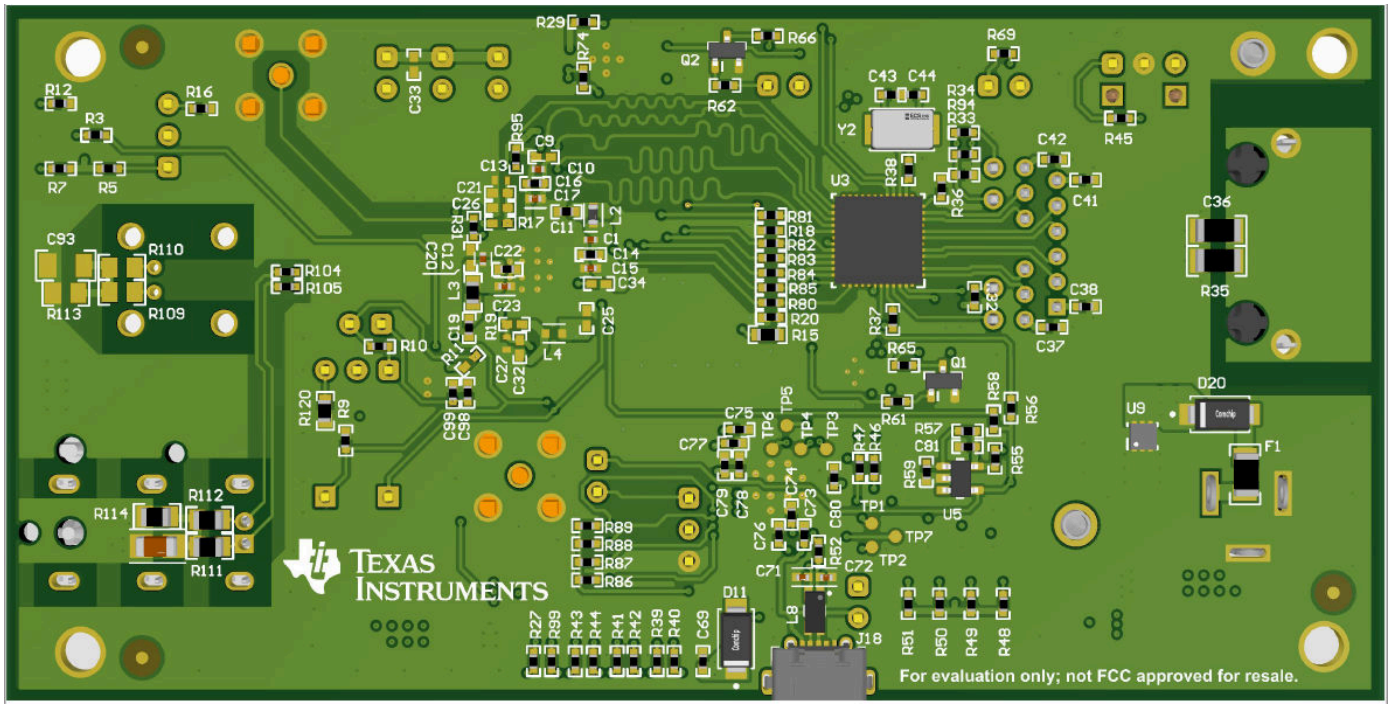


Figure 2-2. DP83TC812EVM-MC – Bottom Side

2.2 Operation – Quick Setup

2.2.1 Onboard Power Supply Operation

- EVM can operate from a single supply connected to the turret or barrel jack connector through TP8 (TP9 is GND)
  - Wide Vin: 5 V to 30 V
- Place shunts on J20, and J21 to enable LDOs for VDD3P3, and VDD1P0
- Place shunt on VDDMAC. This supply can have adjustable voltages depending on location of shunt.
  - J1 for 3.3V operation
  - J3 for 1.8V operation
  - J5 for 2.5V operation
- Place shunts on J23 and J10 (left and center) to enable VSLEEP LDO and keep WAKE pin high

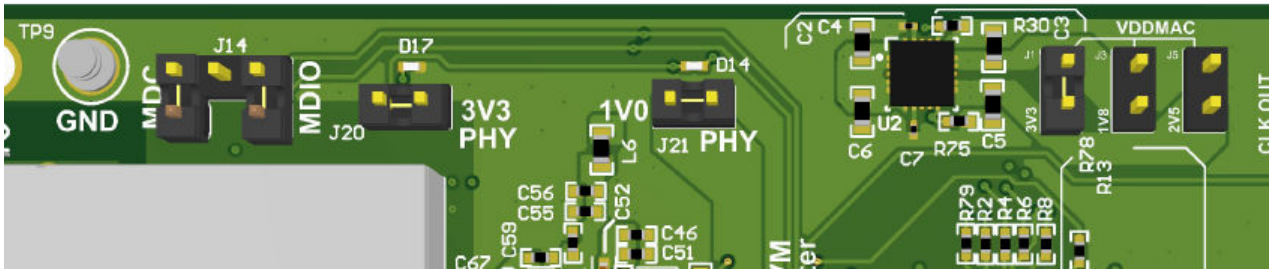


Figure 2-3. Onboard Supply Connection and Jumpers

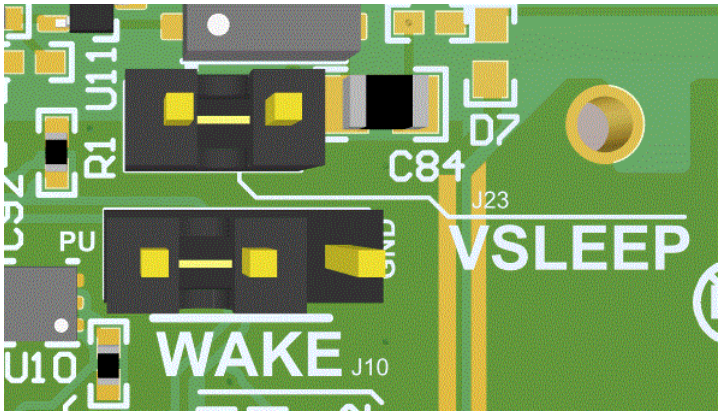


Figure 2-4. VSLEEP and WAKE Jumpers

Note

- The board can be powered over USB by populating J9. Ensure external supply is not connected to TP8.
- This header has a 5-V maximum limit

2.2.2 SMI Connection and Communication

2.2.2.1 On-board MSP Connection

- To connect the DP83TC812 and DP83867 to the on-board MSP430 for MDIO and MDC communication:
  - Populate J14 as indicated in figure below

Note

- To use external MSP connection, please remove jumpers on J14 and connect MDC to top-left most pin and MDIO to top-right most pin
- Cross-connection rewrok required for Rev A board not required for Rev B (current) board

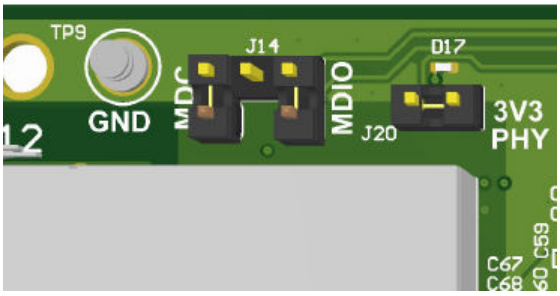


Figure 2-5. On-board MSP connections for MDIO and MDC

2.2.2.2 Downloading USB2MDIO for SMI

The on-board MSP430 comes pre-programmed and ready to use. When using this EVM for the first time on a Windows 10 PC, MSP430 drivers and USB-2-MDIO software utility need to be installed. USB-2-MDIO software can be used for accessing the PHY's registers. The software is available to download along with its user's guide in the link.

USB2MDIO

2.2.2.3 SMI Interface

Note

- DP83TC812 PHY_ID on EVM is 10
- DP83867 PHY_ID on EVM is 01

After installing and enabling the USB2MDIO tool, power on the EVM and connect to the computer through the micro-USB port. Verify communication on each PHY by reading register 0x0001.

- DP83TC812 will read 0x1 = 0x0061 with no link partner and 0x1 = 0x0065 with a link partner connected
- DP83867 will read 0x1 = 0x7949 with no link partner and 0x1 = 0x796D with a link partner connected
- To enable analog loopback on the DP83TC812, write 0x0108 to address 0x0016

2.2.3 Master and Slave Mode Selection – DP83TC812

- Master Mode
  - Place shunt across pins 1 and 2 of J2 as demonstrated in figure below
- Slave Mode
  - Place shunt across pins 2 and 3 of J2

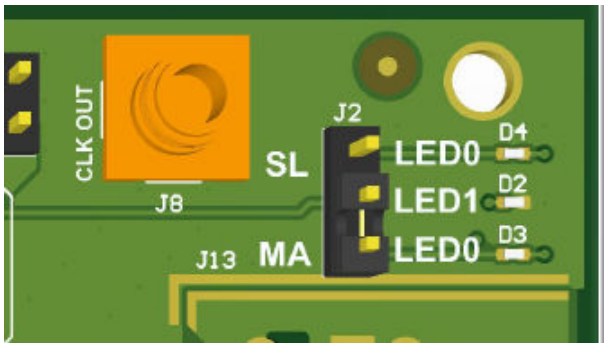


Figure 2-6. DP83TC812 configured as Master

2.2.4 Wake Selection – DP83TC812

- Place shunt in *PU* position at WAKE header shown to pull wake pin of DP83TC812.
- Place shunt in *GND* position at WAKE header shown to pull down wake pin of DP83TC812.

Figure 2-7 shows jumper in PU position on header.

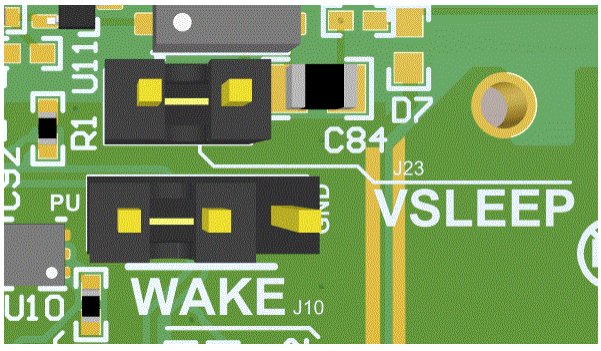


Figure 2-7. Wake pin in pulled up position

2.2.5 LED Indication

- Look for LED_0 (D3 or D4) and LED_1 (D2) to illuminate when a link is successfully established on the DP83TC812
- Look for LED to illuminate on the RJ45 when a link is successfully established on the DP83867
- LED_1 (D2) will blink for TX/RX activity

3 Board Setup Details

3.1 Block Diagram

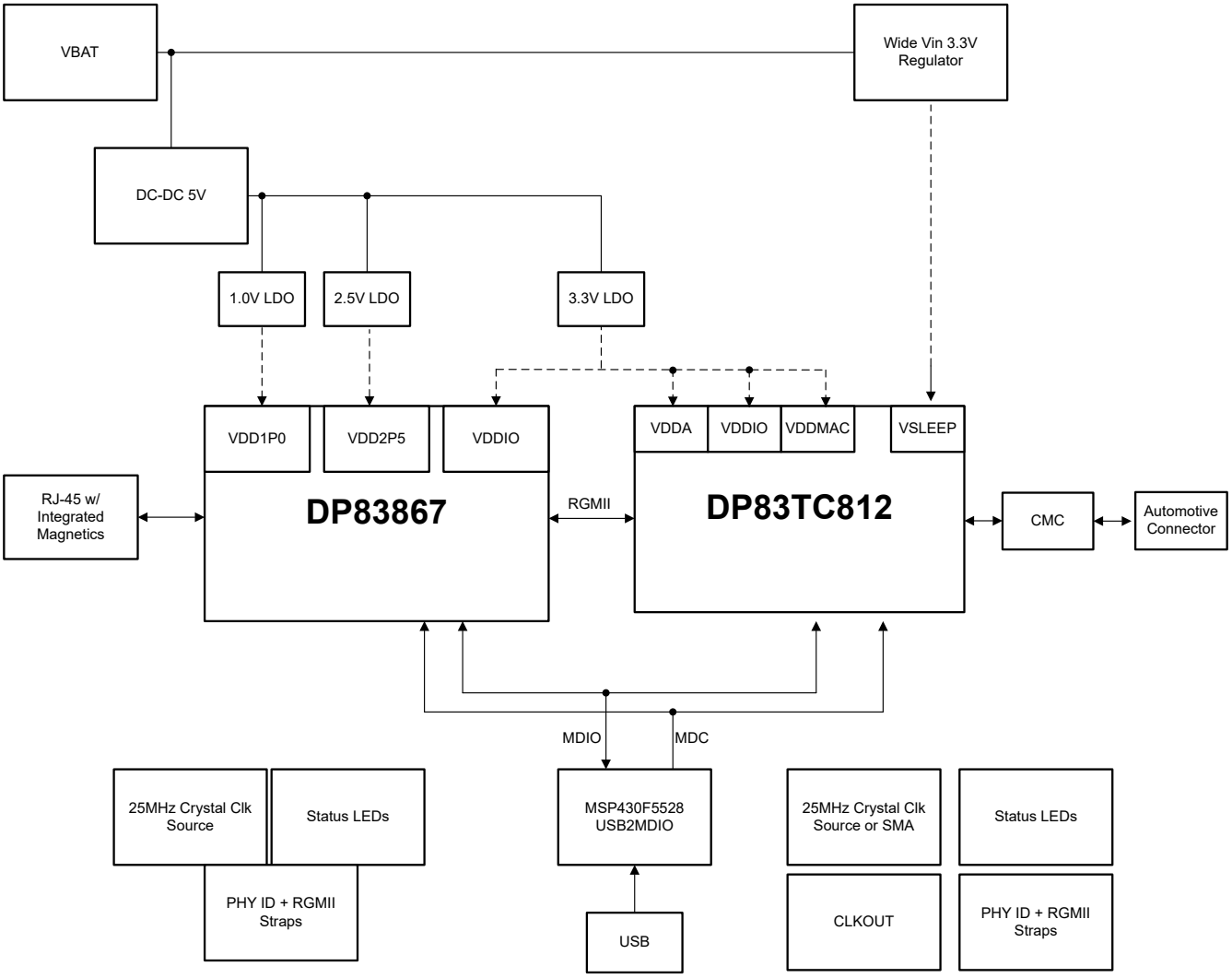


Figure 3-1. DP83TC812EVM-MC Block Diagram

3.2 Configuration Options

3.2.1 Clock Configuration

- Onboard Clock
  - The onboard crystal is enabled by default
- External Clock
  - Remove R97 and Y1
  - Populate R26 with a 0-Ω resistor
  - Use the SMA labeled CLK_IN to input the external clock source

4 Definitions

Terminology

PHY	Physical Layer Transceiver
MAC	Media Access Controller
SMI	Serial Management Interface
MDIO	Management Data I/O
MDC	Management Data Clock
RGMII	Reduced Gigabyte Media Independent Interface
SFD	Start-of-Frame Detection
VDDA	Analog Core Supply Rail
VDDIO	Digital Supply Rail
PD	Pull-down
PU	Pullup
MC	Micro-controller

5 Schematics

5.1 Main Block Schematic

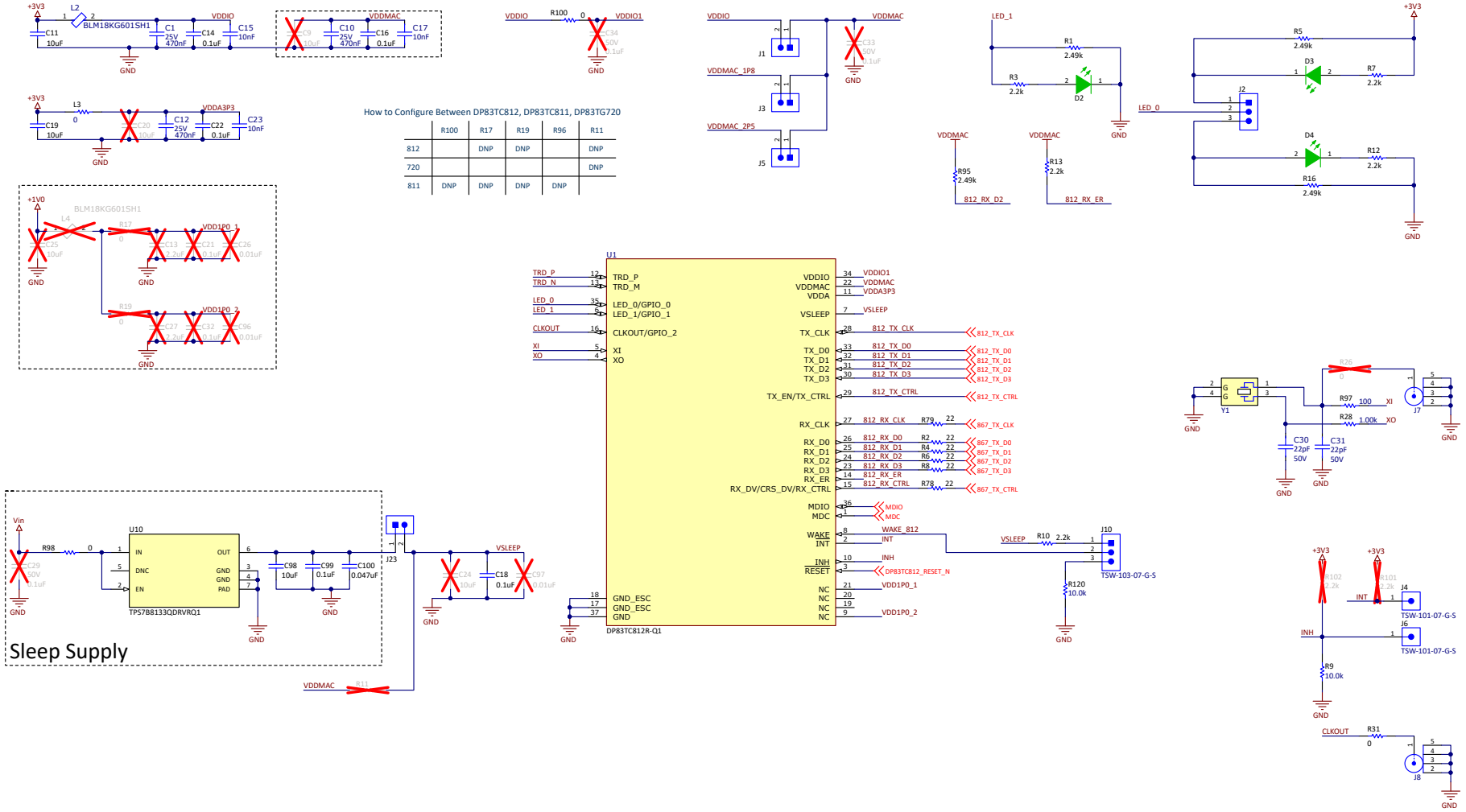


Figure 5-1. Main Schematic

5.2 DP83867 Schematic

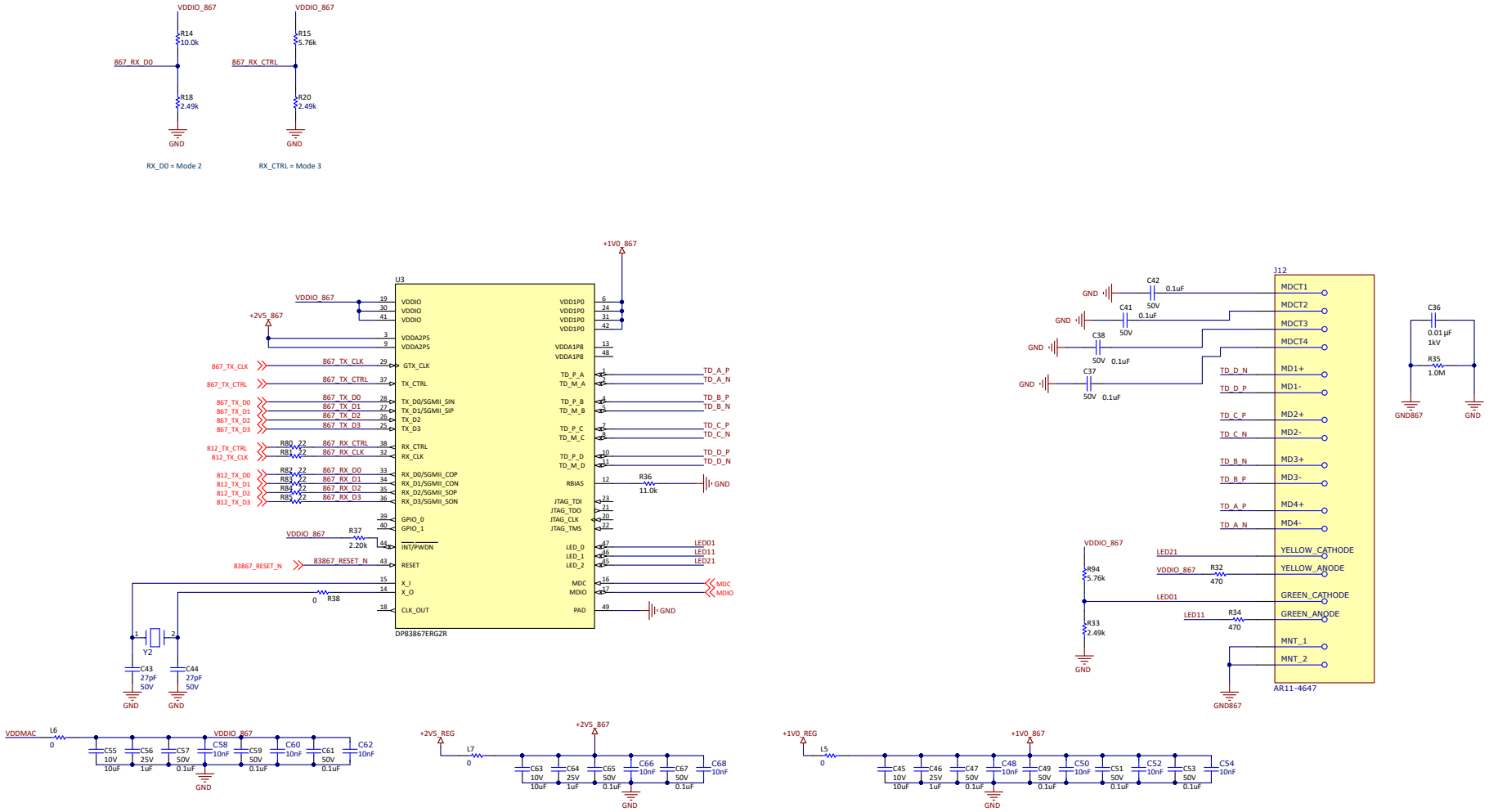


Figure 5-2. DP83867 Schematic

5.3 Power Schematic

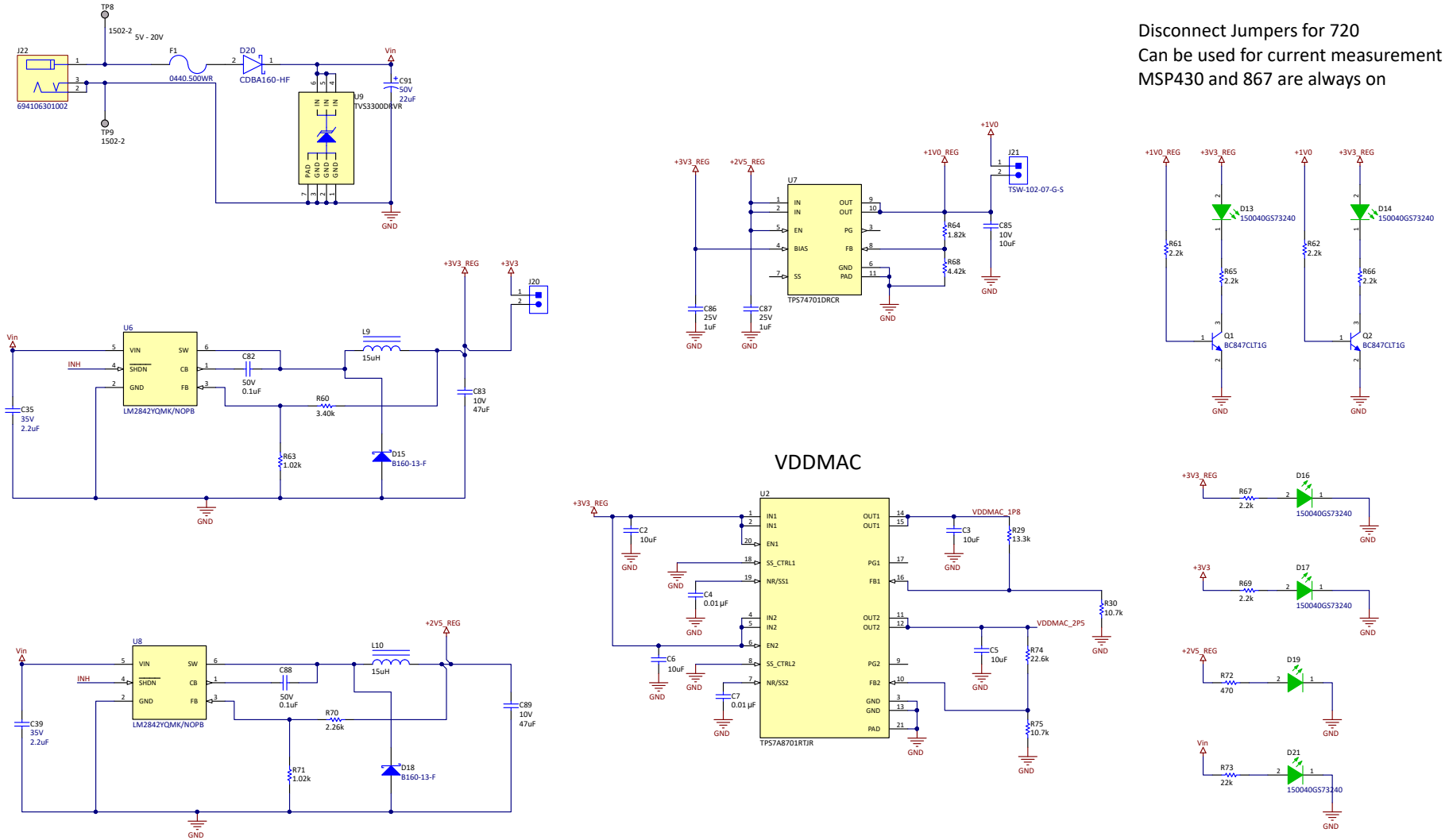


Figure 5-3. Power Schematic

5.4 AFE Schematic

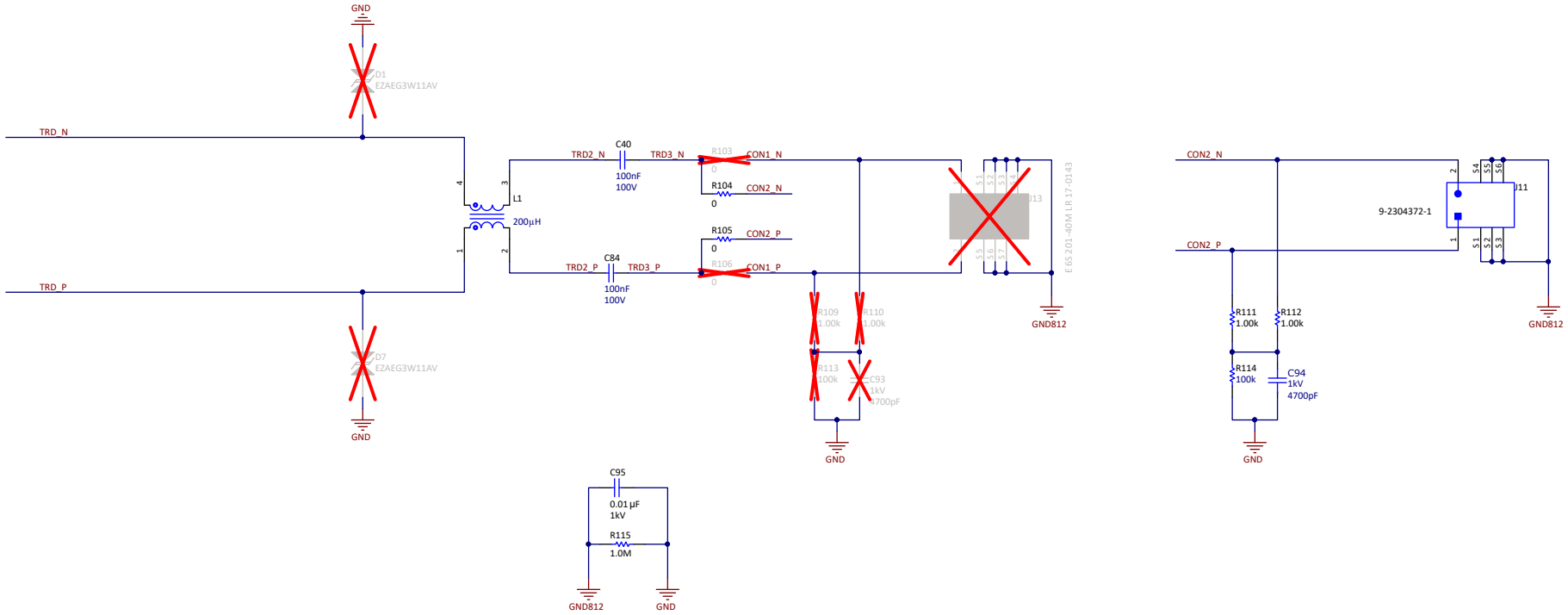


Figure 5-4. AFE Schematic

5.5 Comms Schematic

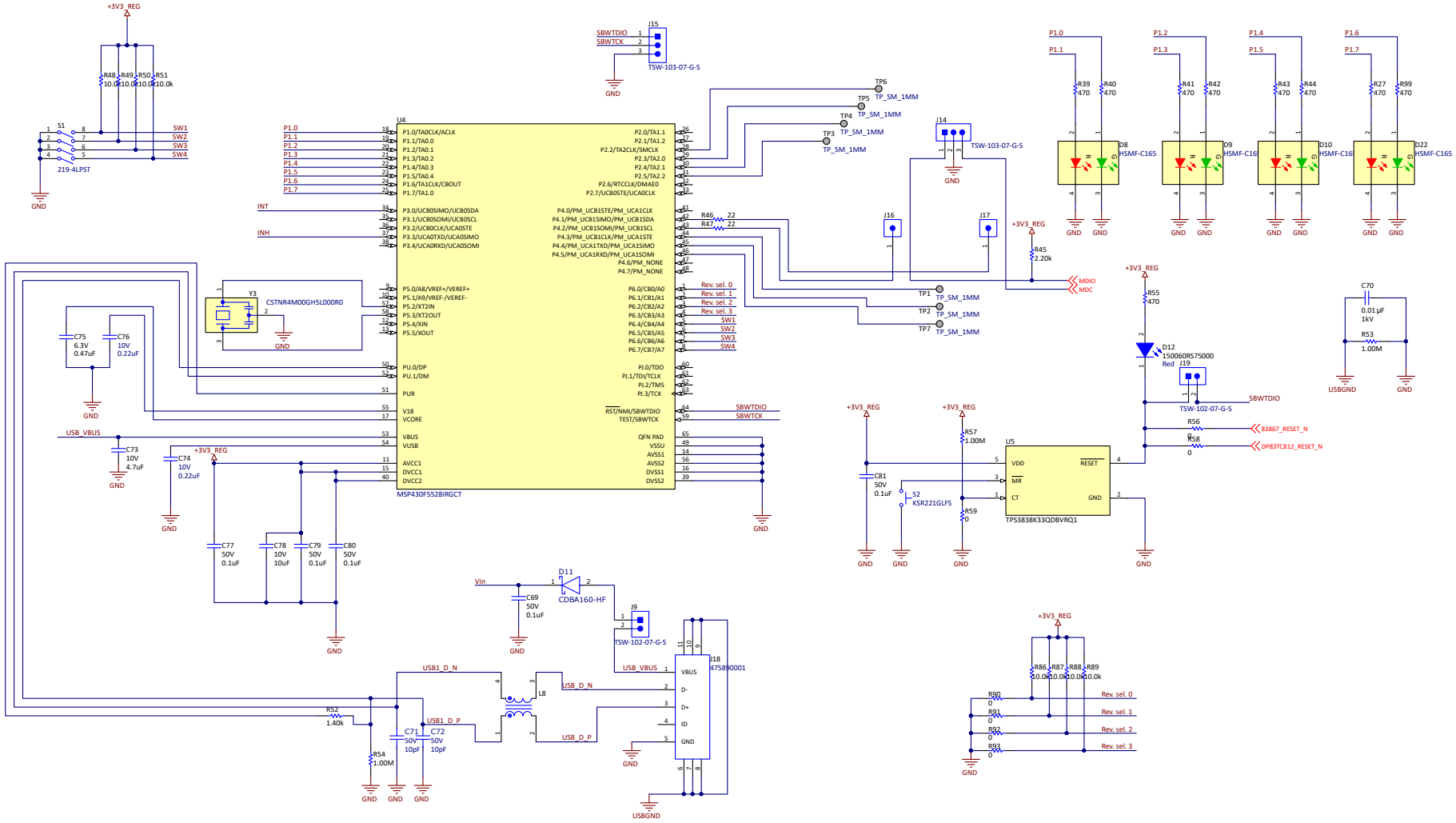
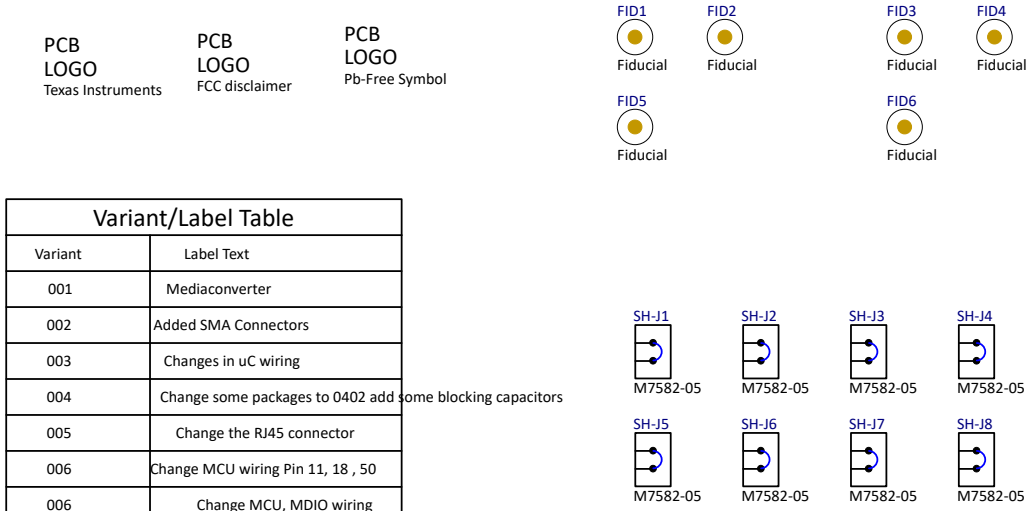


Figure 5-5. Comms Schematic

5.6 Hardware Schematic



Variant/Label Table	
Variant	Label Text
001	Mediaconverter
002	Added SMA Connectors
003	Changes in uC wiring
004	Change some packages to 0402 add some blocking capacitors
005	Change the RJ45 connector
006	Change MCU wiring Pin 11, 18 , 50
006	Change MCU, MDIO wiring

Figure 5-6. Hardware Schematic

6 Layout

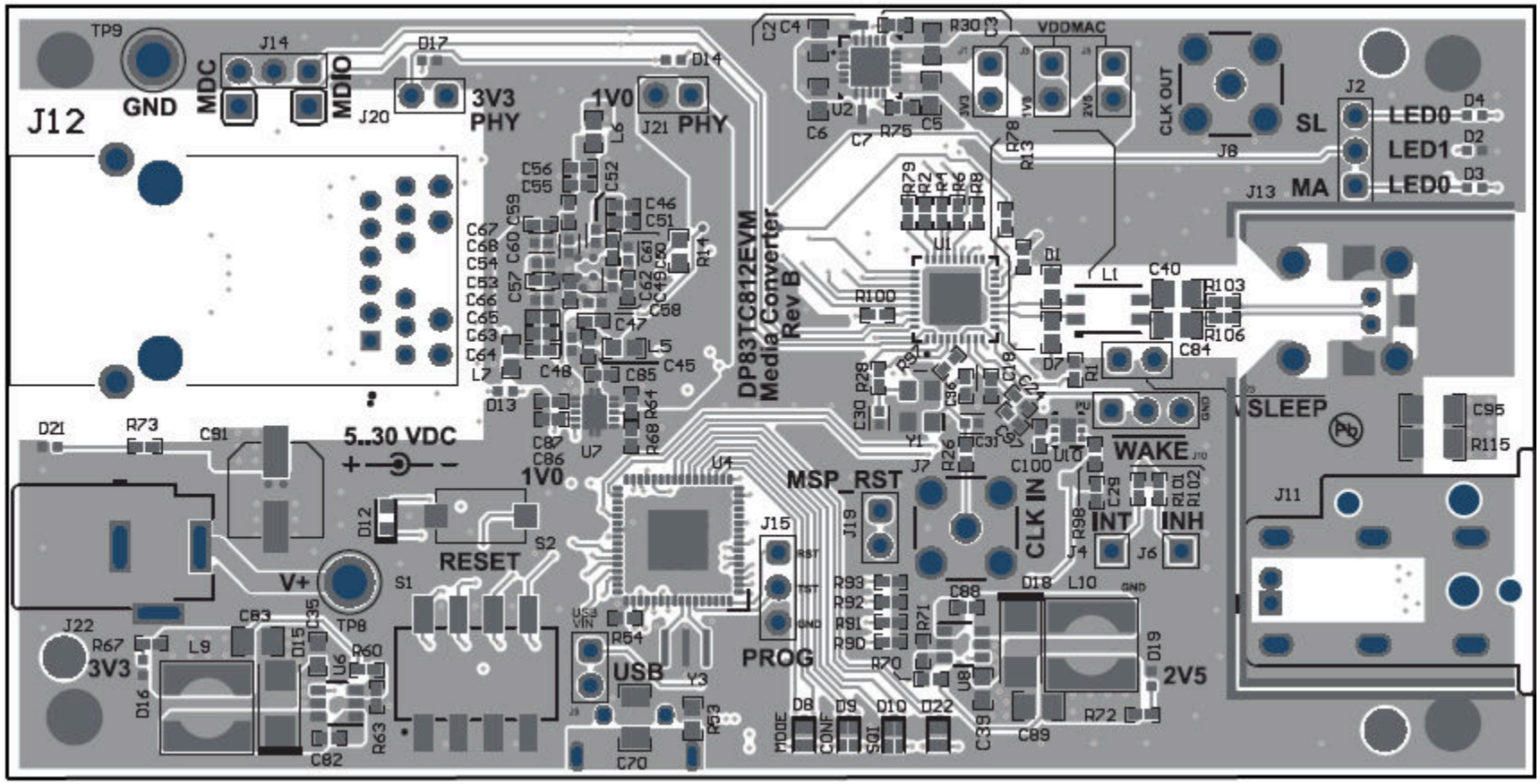


Figure 6-1. Top Overlay

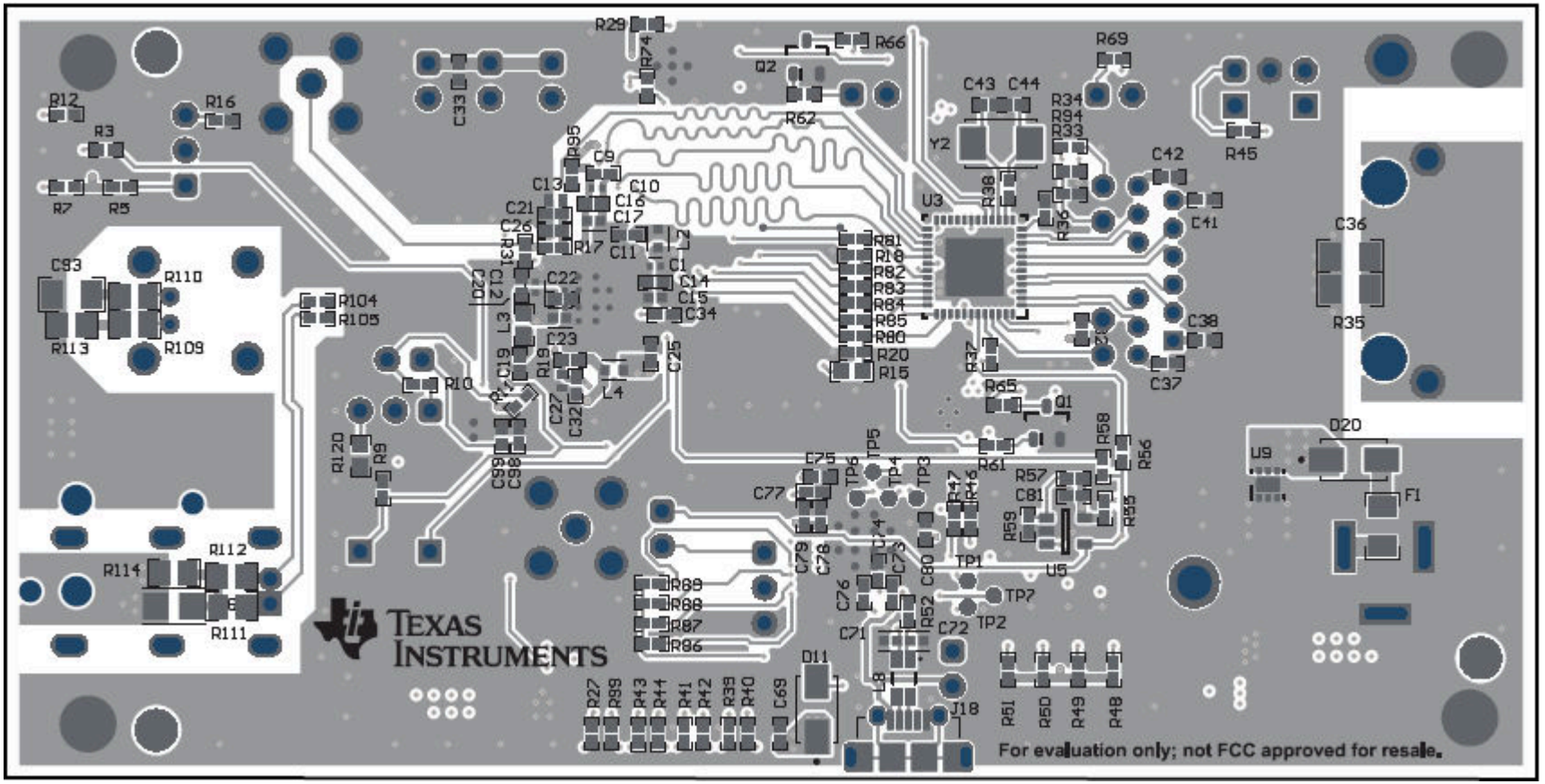


Figure 6-2. Bottom Overlay

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