



xPico® WiFi®  
**Freescale™ Tower System Module**  
**User Guide**

## Intellectual Property

© 2013 Lantronix, Inc. All rights reserved. No part of the contents of this book may be transmitted or reproduced in any form or by any means without the written permission of Lantronix.

*Lantronix* and *xPico* are registered trademarks of Lantronix, Inc. in the United States and other countries. *DeviceInstaller* is a trademark of Lantronix, Inc. U.S. Patents 7,309,260; 8,024,446; 8,219,661; 7,698,405. Additional patents pending.

*Windows* is a trademark of Microsoft Corporation. *Wi-Fi* is a registered trademark of the Wi-Fi Alliance Corporation. *Freescale* is a trademark of Freescale Semiconductor, Inc. All other trademarks, servicemarks and trade names are the property of their respective owners.

## Warranty

For details on the Lantronix warranty policy, please go to our Web site at [www.lantronix.com/support/warranty](http://www.lantronix.com/support/warranty).

## Contacts

### Lantronix, Inc.

167 Technology Drive  
Irvine, CA 92618, USA  
Phone: 949-453-3990  
Fax: 949-453-3995

### Technical Support

Online: [www.lantronix.com/support](http://www.lantronix.com/support)

### Sales Offices

For a current list of our domestic and international sales offices go to the Lantronix web site at [www.lantronix.com/about/contact](http://www.lantronix.com/about/contact).

## Disclaimer and Revisions

**Note:** *This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC and EN55022 Rules when properly enclosed and grounded. These limits are designed to provide reasonable protection against radio interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause interference to radio communications. Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device. The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.*

## Revision History

Date	Rev.	Comments
October 2013	A	Initial Document.

## Table of Contents

Intellectual Property .....	2
Warranty .....	2
Contacts .....	2
Disclaimer and Revisions .....	2
Revision History .....	2
List of Figures .....	4
List of Tables .....	4
<b>1. Introduction</b> .....	<b>5</b>
About this Guide .....	5
Additional Documentation .....	5
<b>2. Evaluation Kit</b> .....	<b>6</b>
xPico Wi-Fi Evaluation Kit Contents .....	6
Evaluation Board Description .....	6
Example Connections on the Freescale Tower System .....	8
Lantronix xPico Wi-Fi Module with K60 MCU Board .....	8
Lantronix xPico Wi-Fi Module with TWR-SER .....	8
Serial Port 1 .....	9
Serial Port 2 .....	9
Antenna Port .....	9
Power Supply .....	10
LEDs .....	10
USB .....	10
SPI and CP .....	11
Evaluation Board Schematic .....	12

## List of Figures

Figure 2-1	xPico Wi-Fi Freescale Tower System Module Connectors and Jumpers	7
Figure 2-2	Evaluation Board Schematic (1 of 7)	12
Figure 2-3	Evaluation Board Schematic (2 of 7)	13
Figure 2-4	Evaluation Board Schematic (3 of 7)	14
Figure 2-5	Evaluation Board Schematic (4 of 7)	15
Figure 2-6	Evaluation Board Schematic (5 of 7)	16
Figure 2-7	Evaluation Board Schematic (6 of 7)	17
Figure 2-8	Evaluation Board Schematic (7 of 7)	18

## List of Tables

Table 2-1	Evaluation Board Connectors, Header and Switches	8
Table 2-2	LEDs Signals	10

# 1. Introduction

## About this Guide

This guide provides the information needed to use the Lantronix® xPico® embedded device server with the evaluation kit. The intended audience is the engineers responsible for integrating the xPico and xPico Wi-Fi® devices into their product. In this document, “xPico” refers to all xPico Ethernet-only modules and “xPico Wi-Fi” refers to all xPico modules which have a Wi-Fi interface.

## Additional Documentation

Visit the Lantronix web site at [www.lantronix.com/support/documentation](http://www.lantronix.com/support/documentation) for the latest documentation and the following additional documentation.

Document	Description
<b><i>xPico Wi-Fi Freescale Tower System Module Quick Start Guide</i></b>	Instructions for getting the xPico module up and running on the Freescale™ tower board.
<b><i>xPico Wi-Fi Embedded Device Server Product Brief</i></b>	Provides a quick reference to xPico Wi-Fi technical specifications.
<b><i>xPico Wi-Fi Embedded Device Server User Guide</i></b>	Provides information needed to configure, use, and build applications on the xPico Wi-Fi unit.
<b><i>xPico Wi-Fi Freescale Tower System Module Lab Guide</i></b>	Provides example software for use with Freescale microcontrollers in the Tower System.

## 2. Evaluation Kit

The Lantronix xPico Wi-Fi Freescale Tower System module (part number TWR-LTRX-XPWK) can help you quickly prototype a design using Wi-Fi with a Freescale microcontroller.

### xPico Wi-Fi Evaluation Kit Contents

- ◆ xPico Wi-Fi Module
- ◆ xPico Wi-Fi Tower Module for Freescale
- ◆ 2 dBi Swivel Type Antenna and U.FL to RP SMA Cable
- ◆ Strip Antenna

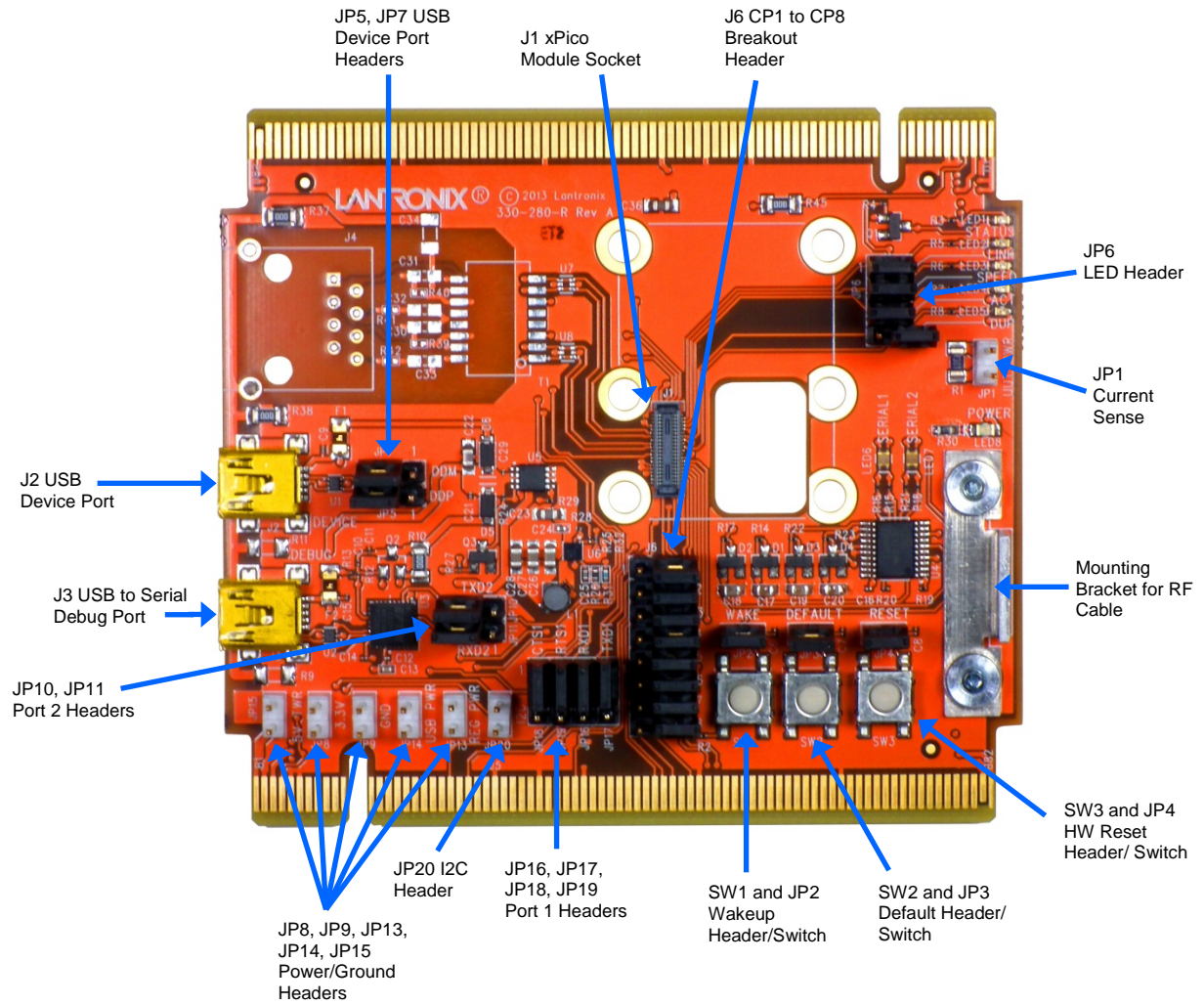
### Evaluation Board Description

The Lantronix xPico Wi-Fi Tower System module provides a test platform for the Lantronix xPico Wi-Fi device server. The Tower System module uses either 5V power from a USB device port connector or power supplied to the Freescale Tower System. The module board includes all necessary regulators to power the 3.3V xPico module. The Lantronix xPico Wi-Fi Tower System module has the following features:

- ◆ Two serial ports connected to the Tower System
- ◆ One mini-type B USB device port connector for 5V input power. This port also has an integrated USB-to-serial converter. The USB-to-serial converter can be connected to the xPico Wi-Fi second serial port via a board jumper setting.
- ◆ A second mini-type B USB device port is available for direct connection to the xPico Wi-Fi device port, selectable via jumper settings. The jumper settings also allow the xPico Wi-Fi USB device port to connect to the tower board MCU USB port.
- ◆ LEDs for the xPico Ethernet, WLAN, and System status outputs
- ◆ Access to all logic level IO signals on the xPico device via header pins for measurements and connection to GPIO lines on the Tower System

The figure below shows the xPico Wi-Fi tower board and highlights all of the various connectors and configuration jumpers. The following table lists each of the connectors and jumper headers along with their function. Further description and pin assignments are included in subsequent sections.

**Figure 2-1 xPico Wi-Fi Freescale Tower System Module Connectors and Jumpers**



**Table 2-1 Evaluation Board Connectors, Header and Switches**

JP	Label	Function	Default
JP1	UUT PWR	Connects to 0.301 ohm current sense resistor R1. Measure voltage on JP1 to calculate module power consumption	Uninstalled
JP2	WAKE	Install to use wake-up input and button (xPico Wi-Fi only)	Installed
JP3	DEFAULT	Install to use Default button	Installed
JP4	RESET	Install to use Hardware Reset button	Installed
JP5 JP7	DDP DDM	1-2: Module USB to Tower System 2-3: Module USB to J2 device port	2-3
JP6	ETH LED	Install jumper 1 to 2 for WLAN status to LED2	1-2, 3-4, 5-6 populated; 7-8 not populated
JP10 JP11	TXD2 RXD2	1-2: Module serial port 2 to Tower System 2-3: Module serial port 2 to USB to serial FTDI, to J3	2-3
JP16 JP17 JP18 JP19	RXD1 TXD1 CTS1 RTS1	1-2: Module connect serial port 1 to tower serial board 2-3: Module connect serial port 1 to tower MCU board	1-2
J6	CP1-8	Connect CP1-8 (and SPI pins) to Tower System	Not Installed

## Example Connections on the Freescale Tower System

### Lantronix xPico Wi-Fi Module with K60 MCU Board

xPico Wi-Fi module:

- ◆ JP16 through JP19, set to 2-3
- ◆ JP5 and JP7 set to 2-3
- ◆ Everything else default

K60 board:

- ◆ Make sure J6 is set 1-2 to have the on-board 50MHz feed the peripherals. If you've used this board with the TWR-SER, it would normally be set to 2-3.

### Lantronix xPico Wi-Fi Module with TWR-SER

xPico Wi-Fi module:

- ◆ JP16 through JP19, set to 1-2
- ◆ JP5 and JP7 set to 1-2



## Serial Port 1

Serial port 1 of the xPico Wi-Fi embedded device server has the signals TX, RX, RTS, and CTS. These signals are connected to serial port 1 on the Tower System. Jumpers JP16 through JP19 allow you to change whether the xPico Wi-Fi module is DTE or DCE. If the xPico Wi-Fi module is connected to an MCU board, the jumpers should be connected 2-3. If using the tower serial board, the jumpers should be 1-2.

xPico Wi-Fi Pin	Tower Elevator Pin JP16-19: 2-3	Tower Elevator Pin JP16-19: 1-2
RXD1 (7)	TXD1 (A44)	RXD1 (A43)
TXD1 (10)	RXD1 (A43)	TXD1 (A44)
RTS1 (5)	GPIO9/CTS1 (A9)	GPIO1/RTS1 (B21)
CTS1 (16)	GPIO1/RTS1 (B21)	GPIO9/CTS1 (A9)

## Serial Port 2

Serial port 2 of the xPico Wi-Fi device has the signals TX and RX. These signals go through jumpers JP10 and JP11. There are two options where this serial port can go. If jumpers JP10 and JP11 are 1-2, then the serial port is connected to serial port 0 on the Tower System. If the jumpers are 2-3, then serial port 2 from the xPico Wi-Fi unit does not go to the Tower System, but instead is routed to an on-board USB to serial converter, which then connects to USB connector J3 on the board.

xPico Wi-Fi Pin	Tower Elevator Pin (JP10, JP11: 1-2)
RXD2 (23)	TXD0 (A42)
TXD2 (25)	RXD0 (A41)

In order to access the unit through the J3 USB port, you will need to install the USB-to-serial VCP driver from FTDI on your PC. It is available in the installation directory of Lantronix® DeviceInstaller™ 4.3.0.2 and later versions, for installation. It can also be obtained from the FTDI website provided below. Once installed, you will be able to view the xPico boot messages as well as provide command inputs through any PC terminal program, such as Tera Term.

Download FTDI USB-to-serial drivers at this website: <http://www.ftdichip.com/Drivers/VCP.htm>

## Antenna Port

The xPico Wi-Fi tower board includes a bracket for mounting the U.FL to reverse polarity SMA RF cable included with the kit. Follow the procedure below when installing the antenna cable. The same procedure applies when using the PCB strip antenna, with the exception that the swivel antenna does not need to be connected to the RF cable.

- ◆ Attach the U.FL cable to the antenna prior to installing the xPico Wi-Fi module on the J1 socket.
- ◆ Attach the plastic mounting clip to the module.
- ◆ Install the module into the socket.
- ◆ Install the external antenna to the SMA end of the RF cable.

**Note:** Install or remove the antenna connections only while the module is powered off.

## Power Supply

The Lantronix xPico Wi-Fi Freescale Tower System module can be powered from either of the USB connectors on the board. There is circuitry on the xPico Wi-Fi tower module that will convert the 5V input from USB to 3.3V to supply to the rest of the Tower System.

This circuitry is turned off if power is detected on the Tower System, and the xPico Wi-Fi module will draw power from the Tower System instead in that case.

## LEDs

The xPico evaluation board includes several LEDs for signal and unit status. The table below lists all of the LEDs and their functions.

**Note:** LEDs 3, 4 and 5 are for future use when the Ethernet is populated.

**Table 2-2 LEDs Signals**

LED	Function
LED1/STATUS	Orange: LED blinks with patterns indicating module status. See the <i>xPico Wi-Fi Embedded Device Server User Guide</i> for a full description of the status LED blink patterns
LED2/LINK JP6: 1-2	Orange: LED is ON when the device is associated with an access point (on the STA interface.) LED is OFF when the device is not associated with an access point.
LED3/SPEED JP6: 3-4	LED is ON when Ethernet is in 100Mbps mode, xPico device with Ethernet only
LED4/ACT JP6: 5-6	LED blinks when there is activity on the Ethernet port, xPico unit with Ethernet only
LED5/DUP JP6: 7-8	LED is ON when Ethernet is in half duplex mode, xPico device with Ethernet only
LED6/SERIAL 1	Orange: Receive activity Green: Transmit activity
LED7/SERIAL 2	Orange: Receive activity Green: Transmit activity
LED8/POWER	Blue: 3.3V Power is on

## USB

There are two USB connectors on the xPico Wi-Fi Tower System module. The J3 connector can optionally be connected to serial port 2 of the xPico Wi-Fi module. See the description for serial port 2.

The xPico Wi-Fi has a USB device-side port that can be connected either to the Tower System or to the J2 USB connector on-board. Use jumpers JP5 and JP7 to control where the xPico Wi-Fi USB port is routed.

xPico Wi-Fi Pin	Tower Elevator Pin (JP5, JP7: 1-2)
DDM (24)	USB0_DM (A54)
DDP (22)	USB0_DP (A55)

The USB device port will be enabled with a future firmware update.

## SPI and CP

The SPI and CP pins can be connected to the Tower System with the jumpers on J6. Please refer to the *xPico Wi-Fi Embedded Device Server User Guide* for details on how to use the SPI and CP ports.

The connections to the Tower System are as show in the following table:

<b>xPico Wi-Fi Pin</b>	<b>J6 Jumper</b>	<b>Tower Elevator Pin</b>
CP1 (35)	1-2	GPIO6 (A35)
CP2/SPI INT# (26)	3-4	GPIO4 (B35)
CP3/SPI MISO (28)	5-6	SPI0_MISO/IO1 (B44)
CP4/SPI_MOSI (30)	7-8	SPI0_MOSI/IO0 (B45)
CP5 (32)	9-10	GPIO15 (A51)
CP6 (34)	11-12	GPIO14 (A50)
CP7/SPI_SCK (27)	13-14	SPI0_CLK (B48)
CP8/SPI_CS (3)	15-16	SPI0_CS0# (B46)

## Evaluation Board Schematic

Figure 2-2 Evaluation Board Schematic (1 of 7)

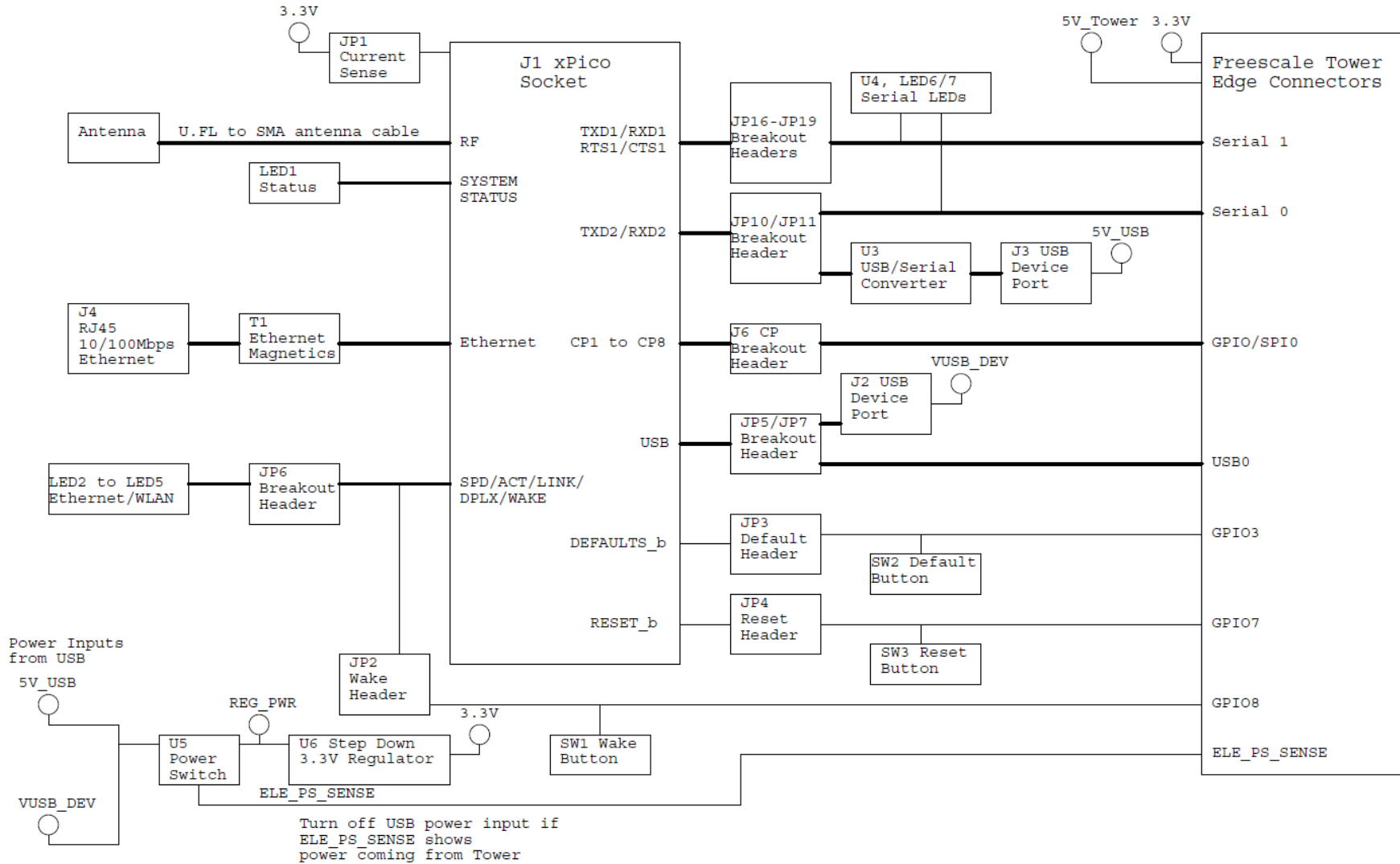


Figure 2-3 Evaluation Board Schematic (2 of 7)

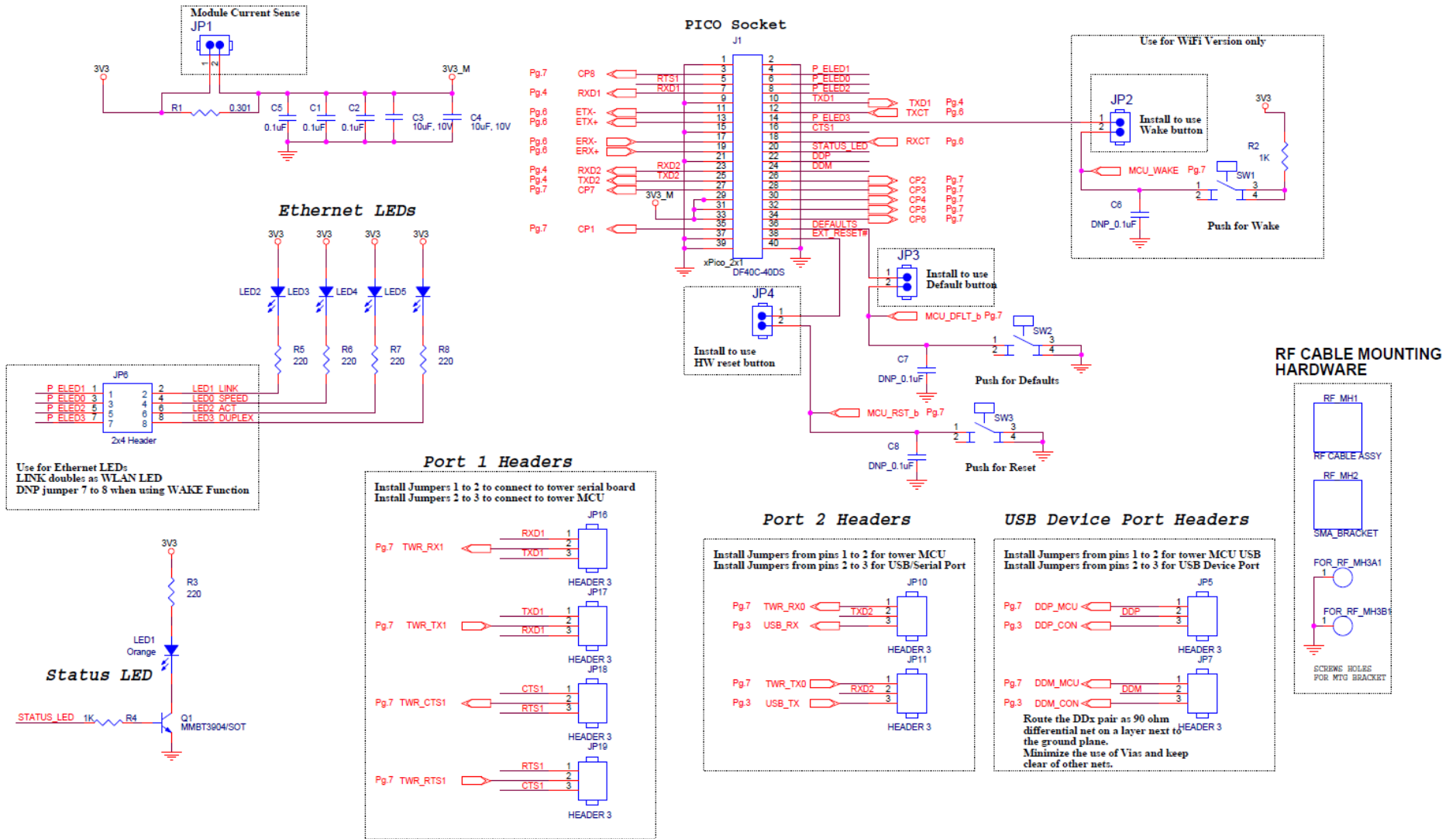


Figure 2-4 Evaluation Board Schematic (3 of 7)

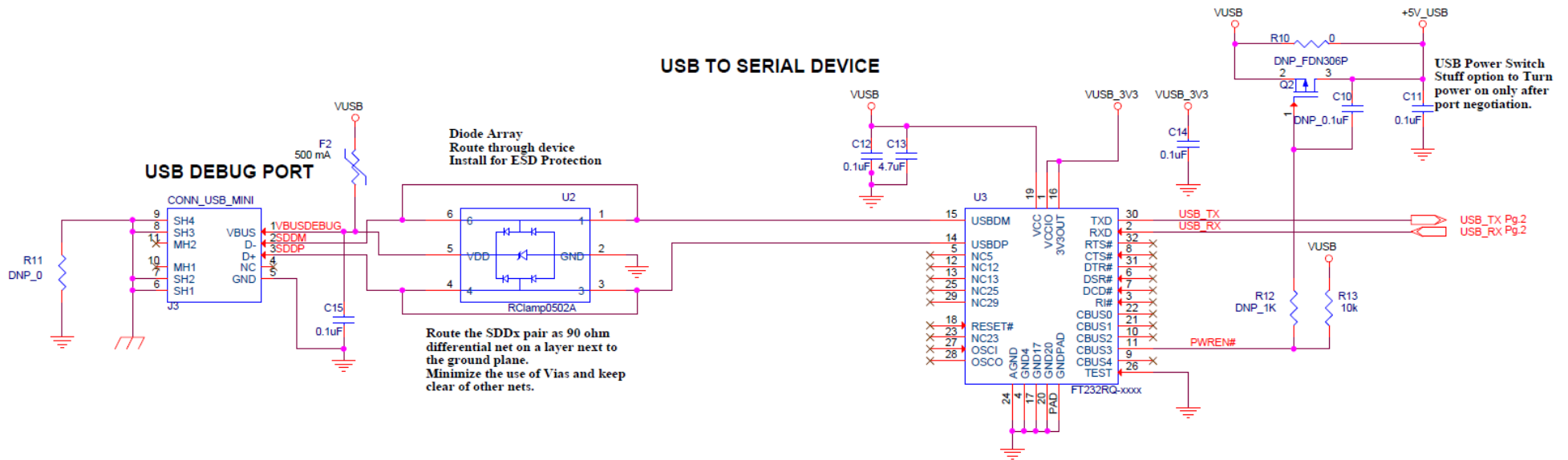
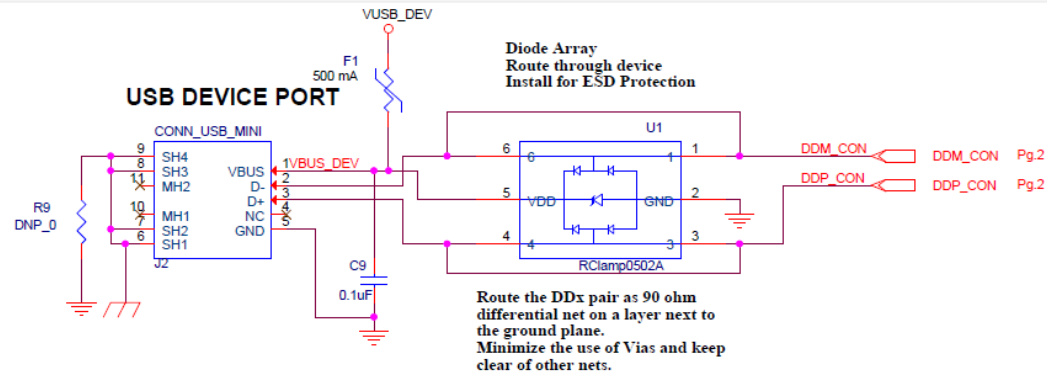


Figure 2-5 Evaluation Board Schematic (4 of 7)

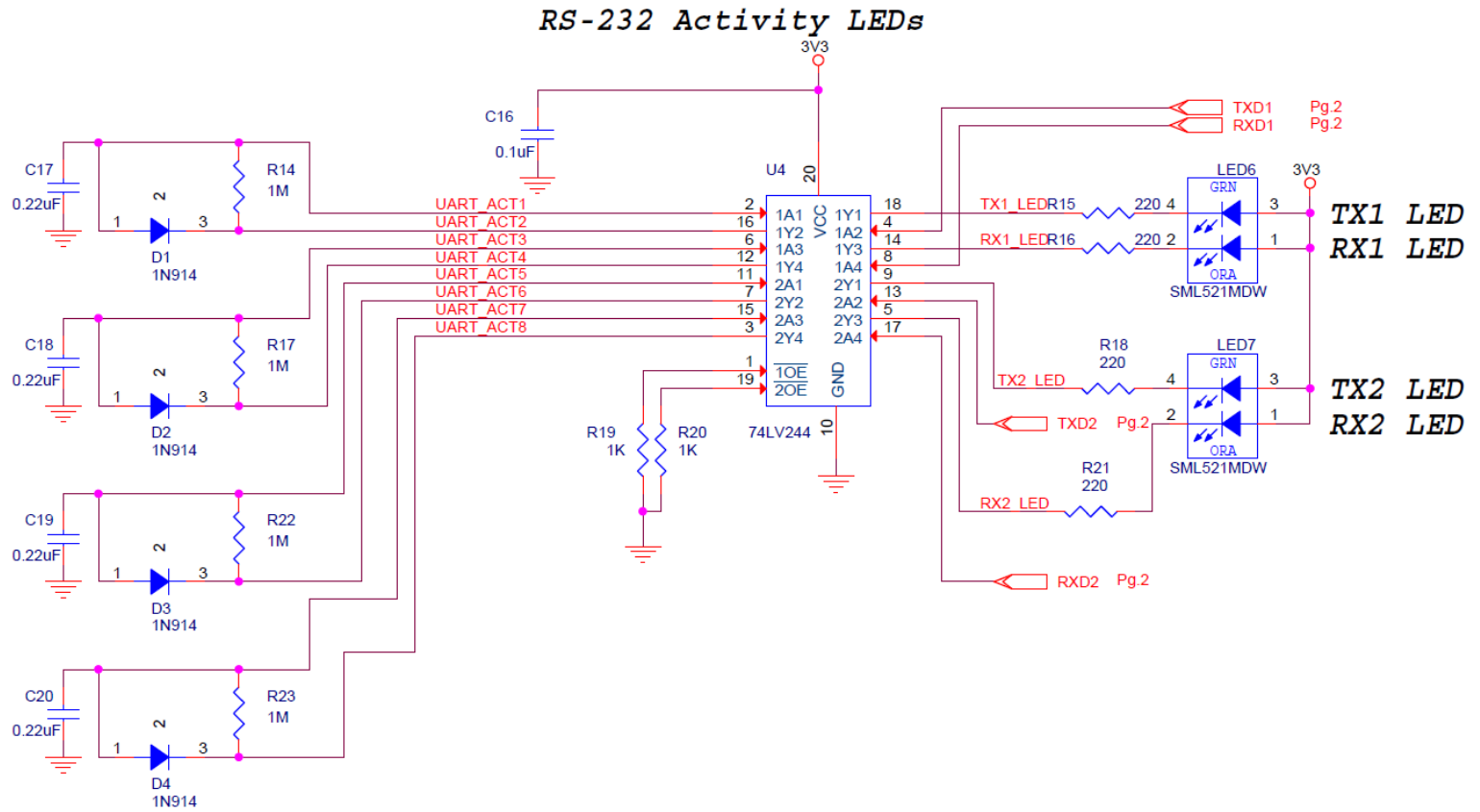


Figure 2-6 Evaluation Board Schematic (5 of 7)

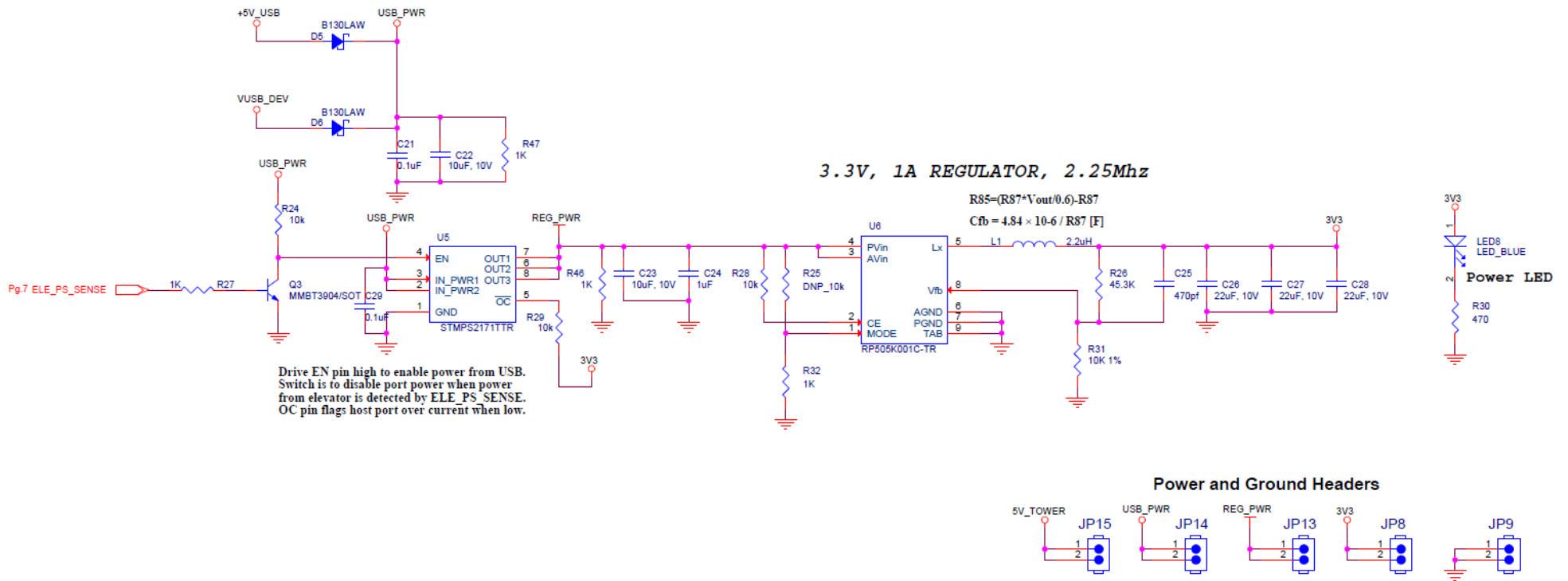




Figure 2-7 Evaluation Board Schematic (6 of 7)

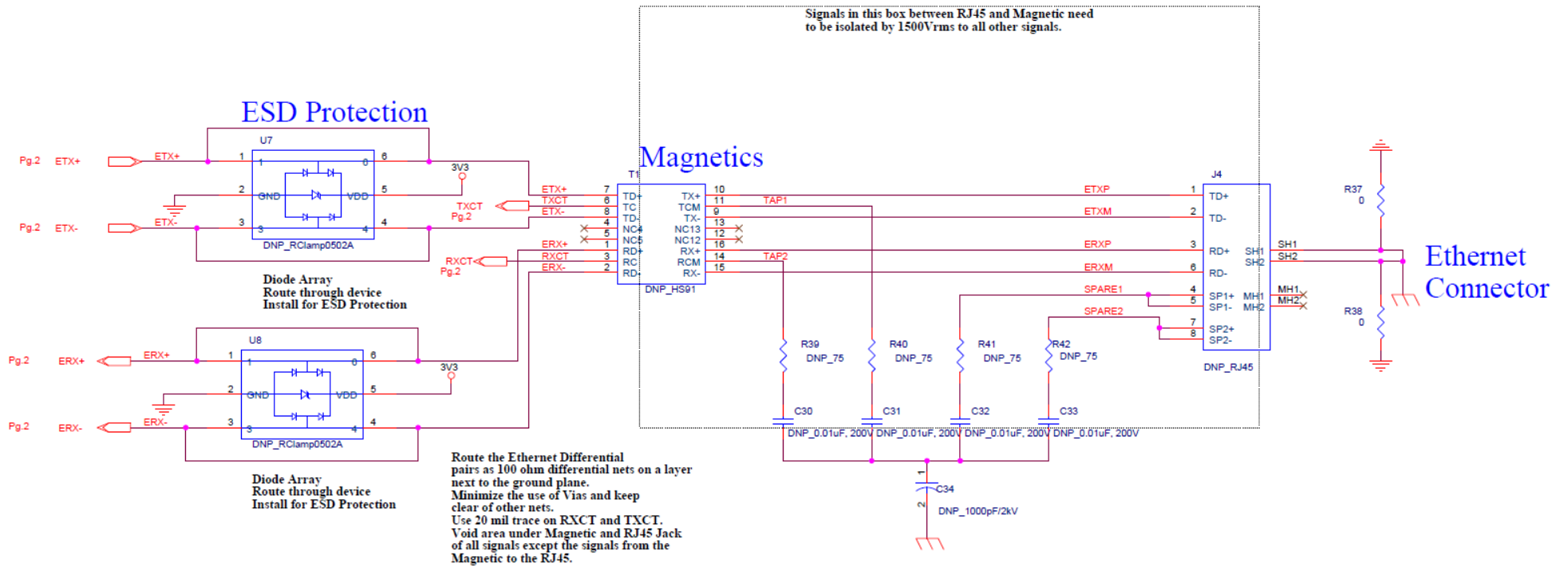


Figure 2-8 Evaluation Board Schematic (7 of 7)

