

# PremierWave<sup>®</sup> 2050 Enterprise Wi-Fi<sup>®</sup> IoT Module Evaluation Kit User Guide

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## Revision History

Date	Rev.	Comments
February 2016	A	Initial document.

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# 1: Introduction

## About this Guide

This user guide provides the information needed to use the Lantronix® PremierWave® 2250 enterprise Wi-Fi® IoT module with the evaluation kit. The intended audiences are the engineers responsible for integrating the PremierWave 2050 module into their product.

**Notes:** Everything required to evaluate the PremierWave 2050 module features and capabilities are provided in the evaluation kit. See [PremierWave 2050 Evaluation Kit Contents](#) for more information.

## 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>PremierWave 2050 Enterprise Wi-Fi IoT Module User Guide</i></b>	Provides information needed to configure, use, and build applications on the PremierWave 2050.
<b><i>PremierWave 2050 Enterprise Wi-Fi IoT Module Command Reference</i></b>	Provides a list and description of PremierWave 2050 module commands.
<b><i>PremierWave 2050 Enterprise Wi-Fi IoT Module Evaluation Kit Quick Start Guide</i></b>	Instructions for getting the PremierWave 2050 module up and running on the evaluation board.
<b><i>PremierWave 2050 Enterprise Wi-Fi IoT Module Integration Guide</i></b>	Provides information for integrating the PremierWave 2050 module on a customer platform.
<b><i>PremierWave 2050 Enterprise Wi-Fi IoT Module Product Brief</i></b>	Provides a quick reference to PremierWave 2050 technical specifications.
<b><i>PremierWave 2050 Enterprise Wi-Fi IoT Module Datasheet</i></b>	Provides a detailed reference to PremierWave 2050 SMT technical specifications.

## 2: Evaluation Kit

The evaluation kit for the PremierWave 2050 module provides an excellent starting point for evaluating the key features and capabilities of the module. The kit can also be used with other elements of the system to facilitate quick integration via the available interface ports.

### PremierWave 2050 Evaluation Kit Contents

Two versions of the Lantronix PremierWave 2050 evaluation kit are available: The kit identified by part number PWGG2051000K includes an evaluation board with installed PW20501 module which has two U.FL connectors and two RP-SMA connectors. The kit with part number PWGG2052000K includes an evaluation board with installed PW20502 module which has one on-module antenna, one U.FL connector, and one RP-SMA connector. Both evaluation kit contents include the following:

- ◆ PremierWave 2050 module
- ◆ Evaluation board with installed PremierWave 2050 module
- ◆ 5V, 1A wall adaptor
- ◆ 2 dBi swivel type antenna (2x in PWGG2051000K)
- ◆ CAT5 Ethernet cable (10 feet)

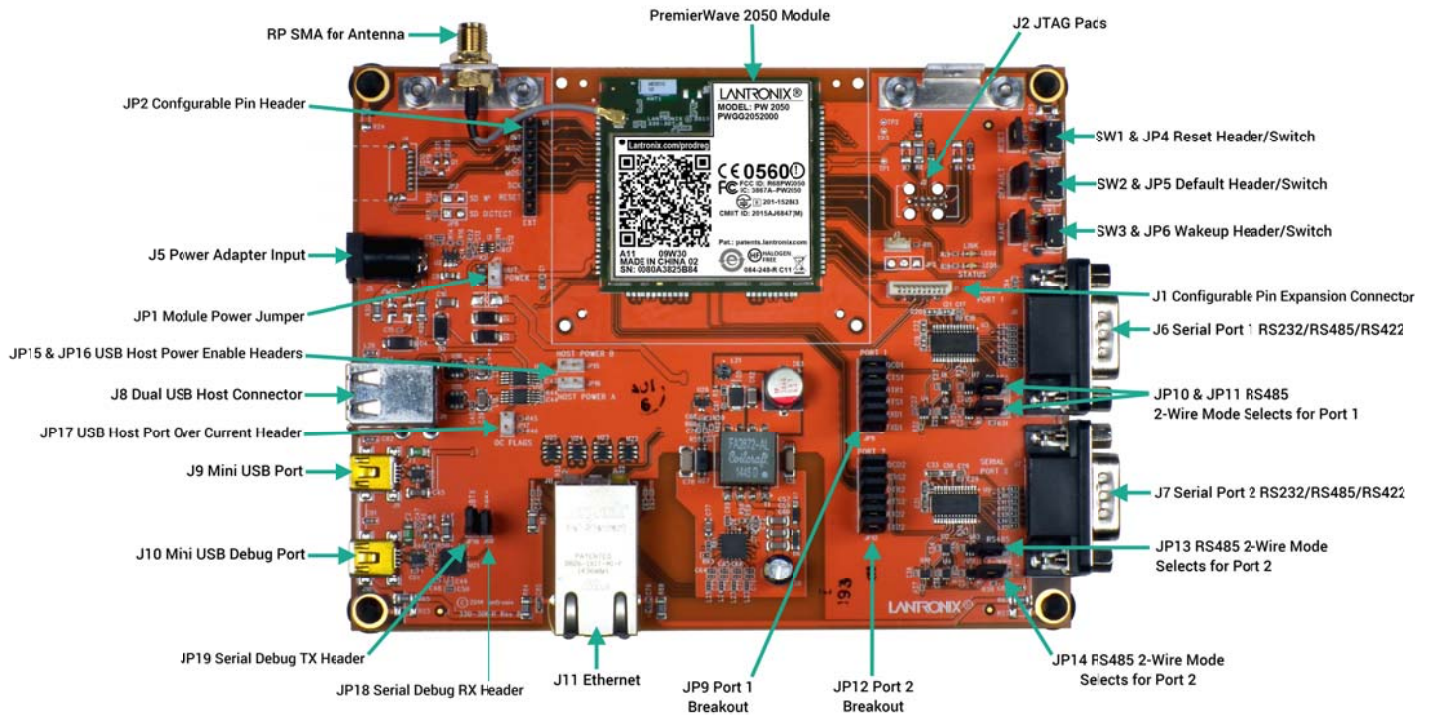
### Evaluation Board Description

The PremierWave 2050 evaluation board provides a test platform for the Lantronix PremierWave 2050 module. The evaluation board uses either a 5V power from a USB device port connector or a power supplied to the Ethernet connector via Power-Over-Ethernet (PoE). The evaluation kit includes a 5V wall adapter with a USB plug to allow powering the evaluation board from a standard power strip. The evaluation board includes all the necessary regulators to power the PremierWave 2050 module and contains the following features:

- ◆ Two DB9 serial port connectors with multi-protocol RS232, RS422, RS485 transceivers at rates up to 1 Mbps. Serial port modes are configured by on-board jumpers.
- ◆ One RJ45 10/100 Ethernet port with an integrated PoE regulator to allow powering from a standard POE PSE.
- ◆ 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 is connected to the PremierWave 2050 module serial debug port.
- ◆ A second mini-type B USB device port is available for connection to the PremierWave 2050 module USB 2.0 high speed device port.
- ◆ Two USB host ports are available on a dual USB type A connector. One of the ports is USB 2.0 high speed and the second is USB 2.0 full speed.
- ◆ LEDs are available for the Ethernet, WLAN, and system status outputs. The Ethernet LEDs are integrated with the RJ45 Jack.
- ◆ Access to all logic level IO signals on the PremierWave 2050 via header pins for measurements and connections to other places.

The figure below shows the PremierWave 2050 evaluation board and highlights all of the 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 PremierWave 2050 Evaluation Board PWGG2052000K Connectors and Jumpers**



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

Ref Des.	Connector/Header Function
J1	Configurable pin expansion connector Connector with 3.3V power, ground, and signals CP1, CP5, CP6, and CP13. Useful for connecting to an off board I2C device over a flex cable.
J2	JTAG pads Port for module JTAG debugger. Connect to ARM debugger with Tag Connect, TC2050-ARM2010 probe cable.
J3	Manufacturing Header Reserved for future testing
J4	Micro SD Card Slot Reserved for future use with SDIO compatible module
J5	5V Power Connector Use with external 5V power supply
J6	Serial Port 1 Standard DB9 port for connection to RS232, RS485, and RS422 networks



Ref Des.	Connector/Header Function
J7	Serial Port 2 Standard DB9 port for connection to RS232, RS485, and RS422 networks
J8	Dual Type A USB Host Port Port A of jack is a USB2.0 full speed port Port B of jack is a USB2.0 high speed port
J9	Mini USB Connector Standard USB device port that can be used to power the evaluation board and/or drive the PremierWave 2050 module USB 2.0 High Speed device port.
J10	Mini USB Connector Standard USB device port that can be used to power the evaluation board and/or drive the evaluation board USB-to-serial converter. The USB serial port converter is connected to the module serial debug port
J11	Ethernet Jack RJ45 jack for connection to the module Ethernet port
JP1	Module Power Jumper Allows for power measurement of the PremierWave 2050 module. Remove L1 and install current sensor in line with JP1 for module current measurements
JP2	Configurable Pin Header Header with 3.3V power, ground, C1, CP2, CP3, CP4, CP7, CP8. Useful for connecting to SPI devices.
JP3	Not installed - reserved for future use
JP4	HW Reset Button Jumper Allows access to module HW reset signal and SW1 push button. Install to use SW1 as HW reset button.
JP5	Default Button Jumper Allows access to module reset to default signal and SW2 push button. Install to use SW2 as reset to default button.
JP6	WAKE Header Allows access to module WAKE signal and SW3 push button. Install to use SW3 to wake up the PremierWave 2050 module when in low power modes.
JP7	SDIO Card WP Header Reserved for future use with SDIO compatible modules
JP8	SDIO Card Detect Header Reserved for future use with SDIO compatible modules
JP9	Serial Port 1 Breakout Header Install jumpers to connect PremierWave 2050 Serial Port 1 flow control signals to the RS232/RS422/RS485 transceiver for Serial Port 1.
JP10	Serial Port 1 RS232/RS422/RS485 Mode Jumper Leave open for RS232 mode. Install for RS422/RS485
JP11	Serial Port 1 RS422/RS485 Mode Jumper Leave open for RS232 or 4-wire mode. Install for 2-wire mode.
JP12	Serial Port 2 Breakout Header Install jumpers to connect PremierWave 2050 Serial Port 2 flow control signals to the RS232/RS422/RS485 transceiver for Serial Port 2.

Ref Des.	Connector/Header Function
JP13	Serial Port 2 RS232/RS422/RS485 Mode Jumper Leave open for RS232 mode. Install for RS422/RS485
JP14	Serial Port 2 RS422/RS485 Mode Jumper Leave open for RS232 or 4-wire mode. Install for 2-wire mode.
JP15, JP16	USB Host Power Enable Headers Leave open to enable USB host port power. Install Jumper to turn off host port power.
JP17	USB Host Port Over Current Header Provides a connection point to the USB host port over-current current flags
JP18	Serial Debug RX Header Install to connect the serial debug port receive line to the USB to serial converter on J10
JP19	Serial Debug TX Header Install to connect the serial debug port transmit line to the USB to serial converter on J10
SW1	Module Hardware Reset When pushed asserts the PremierWave 2050 module hardware reset to reboot the module.
SW2	Module Reset to Default When pushed asserts the PremierWave 2050 module reset to default function.
SW3	WAKE Button When pushed asserts the PremierWave 2050 module WAKE signal. Functional for PremierWave 2050 module only.

## Serial Ports 1 and 2 RS232/RS485/RS422 Connections

The evaluation board has two multiprotocol RS-232/RS422/RS485 ports for connection to the PremierWave 2050 internal UARTs. Serial port 1 is a DB9 type connector labeled J6. Serial port 2 is a DB9 type connector labeled J7. A null modem cable can be used to connect J6 and J7 directly to a standard PC RS232 serial port.

The tables below list the RS232/RS422/RS485 signals and corresponding pins on the evaluation board DB9 connectors. All signals at J6 and J7 are level-shifted by a multiprotocol transceiver.

**Table 2-2 RS-232 Signals on J6 and J7 Serial Ports**

PremierWave 2050 Evaluation Board PIN FUNCTION SERIAL PORTS	DB9 Pin #
TX_232 (Data Out)	3
RX_232 (Data In)	2
CTS_232 (HW Flow Control Input)	8
RTS_232 (HW Flow Control Output)	7
DTR_232 (Modem Control Output)	4
DCD_232 (Modem Control Input)	1
GND (Ground)	5

**Table 2-3 RS-422 4-Wire Signals on J6 and J7 Serial Ports**

PremierWave 2050 Evaluation Board PIN FUNCTION SERIAL PORTS	DB9 Pin #
TX- (Data Out)	3
RX+ (Data In)	2
TX+ (Data Out)	7
RX- (Data In)	8
GND (Ground)	5

**Table 2-4 RS-485 2-Wire Signals on J6 and J7 Serial Ports**

PremierWave 2050 Evaluation Board PIN FUNCTION SERIAL PORTS	DB9 Pin #
TX-/RX- (Data IO)	3
TX+/RX+ (Data IO)	7
GND (Ground)	5

The J6 and J7 DB9 ports are configured for RS232, RS422 (4-wire), or RS485 (2-wire) by jumper settings on JP10, JP11, JP13, and JP14. The table below lists the correct jumper installation for each mode.

**Table 2-5 JP10, JP11, JP13 and JP14 Jumper Settings for Serial Ports**

Serial Port 1 Mode (J6)	JP10	JP11
Serial Port 2 Mode (J7)	JP13	JP14
RS232 (Default)	OUT	OUT
RS485 2-wire	IN	IN
RS422 4-wire	IN	OUT

All of the PremierWave 2050 serial port signals can be used as configurable pins. Jumper headers JP9 and JP12 have been included to allow for each of the serial port signals to be connected or disconnected from the serial port transceiver. The tables below list the JP9 and JP12 serial port signal connections. Install jumper or remove as needed for desired function.

**Table 2-6 JP9 Serial Port 1 Flow Control Break Out Header**

PremierWave 2050 Module Pin	PremierWave 2050 Module PIN FUNCTION	JP9 Pin #	JP9 Pin #	J6 Evaluation Board Function
83	Serial Port TX (output)	2	1	RS232, RS485 TX
82	Serial port RX (input)	4	3	RS232, RS485 RX
81	Serial port RTS1 or TX enable or configurable pin	6	5	RS232 RTS, RS485 TX Enable
59	Configurable pin CP11 or serial port DTR1	8	7	RS232 DTR
80	Serial port CTS1 or configurable pin	10	9	RS232 CTS
58	Configurable pin CP12 or serial port DCD1	12	11	RS232 DCD

**Table 2-7 JP12 Serial Port 2 Flow Control Break Out Header**

PremierWave 2050 Module Pin	PremierWave 2050 Module PIN FUNCTION	JP9 Pin #	JP9 Pin #	J6 Evaluation Board Function
79	Serial Port TX (output)	2	1	RS232, RS485 TX
78	Serial port RX (input)	4	3	RS232, RS485 RX
24	Serial port RTS2 or TX enable or configurable pin	6	5	RS232 RTS, RS485 TX Enable
26	Configurable pin CP9 or Serial port DTR2	8	7	RS232 DTR
25	Serial port CTS2 or configurable pin	10	9	RS232 CTS
60	Configurable pin CP10 or Serial port DCD2	12	11	RS232 DCD

## Serial Debug Port

In order to access the unit through the J10 USB port, you will need to install the USB-to-serial VCP driver from FTDI on your PC. The VCP driver can be obtained from the FTDI website at <http://www.ftdichip.com/Drivers/VCP.htm>. Once installed, you will be able to view the PremierWave 2050 boot messages as well as provide command inputs through any PC terminal program, such as Tera Term.

In addition, JP18 and JP 19 need to be installed.

**Table 2-8 Jumper to USB to Serial Converter**

PremierWave 2050 Module Pin	PremierWave 2050 Module PIN FUNCTION	Jumper to USB to serial converter
27	Serial debug Port TX (output)	JP19
28	Serial debug port RX (input)	JP18

## Antenna Port

The PremierWave 2050 evaluation board includes two brackets for mounting the U.FL to reverse polarity SMA RF cables 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.

1. Attach the U.FL cable to the antenna prior to installing the PremierWave 2050 module.
2. 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.

## Ethernet Port

The PremierWave 2050 evaluation board includes one RJ45 with on-board magnetics for connection to the PremierWave 2050 module 10/100Mbps Ethernet interface. Connector J11 is the Ethernet port.

## Power Supply

The evaluation board provides three options for input power. Included with the kit is a 5V wall adapter that plugs into J5. In addition to powering from the wall adapter, the evaluation board can also be powered from a standard PC USB host port by connecting a USB cable between the PC and either J9 or J10. The evaluation board can also be powered via PoE. The integrated PoE regulator accepts power from the Ethernet port on J11.

**Table 2-9 Evaluation Board Power Options**

Input Power Option	Description
<b>5V Wall Cube</b>	Connect the 5V wall cube to J5.
<b>USB</b>	Connect the J9 or J10 USB power to a PC USB Host Port. <b>Note:</b> For J10 connection, the PC host port can communicate with the module debug port via an on-board USB-to-serial converter. For J9 connection, the PC can communicate with the module device port on PremierWave 2050 module.
<b>PoE</b>	Connect the J11 Ethernet port to an external PoE PSE switch or PoE injector.

## LEDs

The PremierWave 2050 evaluation board includes several LEDs for signal and unit status. The table below lists all of the LEDs and their functions.

**Table 2-10 LEDs Signals**

Module Pin	LED Ref Design	Color	LED Function
67	LED 1	Orange	<b>PremierWave 2050 Status</b> <ul style="list-style-type: none"> <li>◆ <b>Power is ON/No Error</b> – LED displays a continuous solid light</li> <li>◆ <b>No Ethernet Link</b> - LED flashes long, long, short, short (repeat)</li> <li>◆ <b>No IP obtained from Ethernet Network</b> - LED flashes long, long, short, short, short (repeat) in amber</li> <li>◆ <b>No WLAN Link</b>- LED flashes long, long, long, short, short (repeat)</li> <li>◆ <b>No IP obtained from WLAN Network</b> - LED flashes long, long, long, short, short, short (repeat)</li> </ul>
73	LED 2	Orange	<b>WLAN Status</b> <ul style="list-style-type: none"> <li>◆ <b>Device Associated with Access Point</b> (on STA interface)- LED is ON</li> <li>◆ <b>Device NOT Associated with Access Point</b> - LED is OFF</li> <li>◆ <b>WPS Triggered</b> – LED flashes a fast blinking pattern</li> <li>◆ <b>WPS Profile Error</b> - LED flashes long, long, long, short, short, 2 seconds off (continuous pattern)</li> <li>◆ <b>WPS Timeout Error</b> - LED flashes long, long, long, short, short, short, short, 2 seconds off (continuous pattern)</li> </ul>
56	J11 pin 17	Yellow	◆ <b>Ethernet Speed 100 Mbps Mode</b> - LED is ON
72	J11 pin 19	Green	◆ <b>Ethernet Link/Activity</b> - LED is ON when there is an Ethernet link and blinks when there is Ethernet activity

## Additional Headers

The table below lists the pin functionality of the additional evaluation board headers.

**Table 2-11 Additional Headers**

Module Pin	Header Pin	Signal	Function
66	JP5 pin 2	Module reset to defaults (active low)	Install jumper (JP3 pins 1 to 2) to use SW2 for asserting default function.
77	JP4 pin 2	Module hardware reset (active low)	Install jumper (JP4 pins 1 to 2) to use SW1 for asserting hardware reset.
65	JP6 pin 2	Module wake up (rising edge triggered)	Install jumper (JP16 pins 1 to 2) to use SW3 for asserting module wake up.
	JP2 pin 1	Board 3.3V power	Test point
68	JP2 pin 2	CP2, configurable pin	External SPI Interrupt
12	JP2 pin 3	CP3, configurable pin	External SPI MISO
15	JP2 pin 4	CP8, configurable pin	External SPI CS

Module Pin	Header Pin	Signal	Function
13	JP2 pin 5	CP4, configurable pin	External SPI MOSI
14	JP2 pin 6	CP7, configurable pin	External SPI SCK
71	JP2 pin 7	CP1, configurable pin	External SPI Device Reset
	JP2 pin 8	Ground	Test point
	J1 pin 1	Board 3.3V power	
	J1 pin 2	Board 3.3V power	
71	J1 pin 3	CP1, configurable pin	External I2C Device Reset
17	J1 pin 4	CP6, configurable pin	External I2C Device Clock
16	J1 pin 5	CP5, configurable pin	External I2C Device Data IO
57	J1 pin 6	CP13 configurable pin	External I2C Device Interrupt
	J1 pin 7	Ground	
	J1 pin 8	Ground	
	J1 pin 9	Not connected	
	J1 pin 10	Not connected	

# Evaluation Board Schematic

Figure 2-2 Evaluation Board Schematic for Part 1 of 4

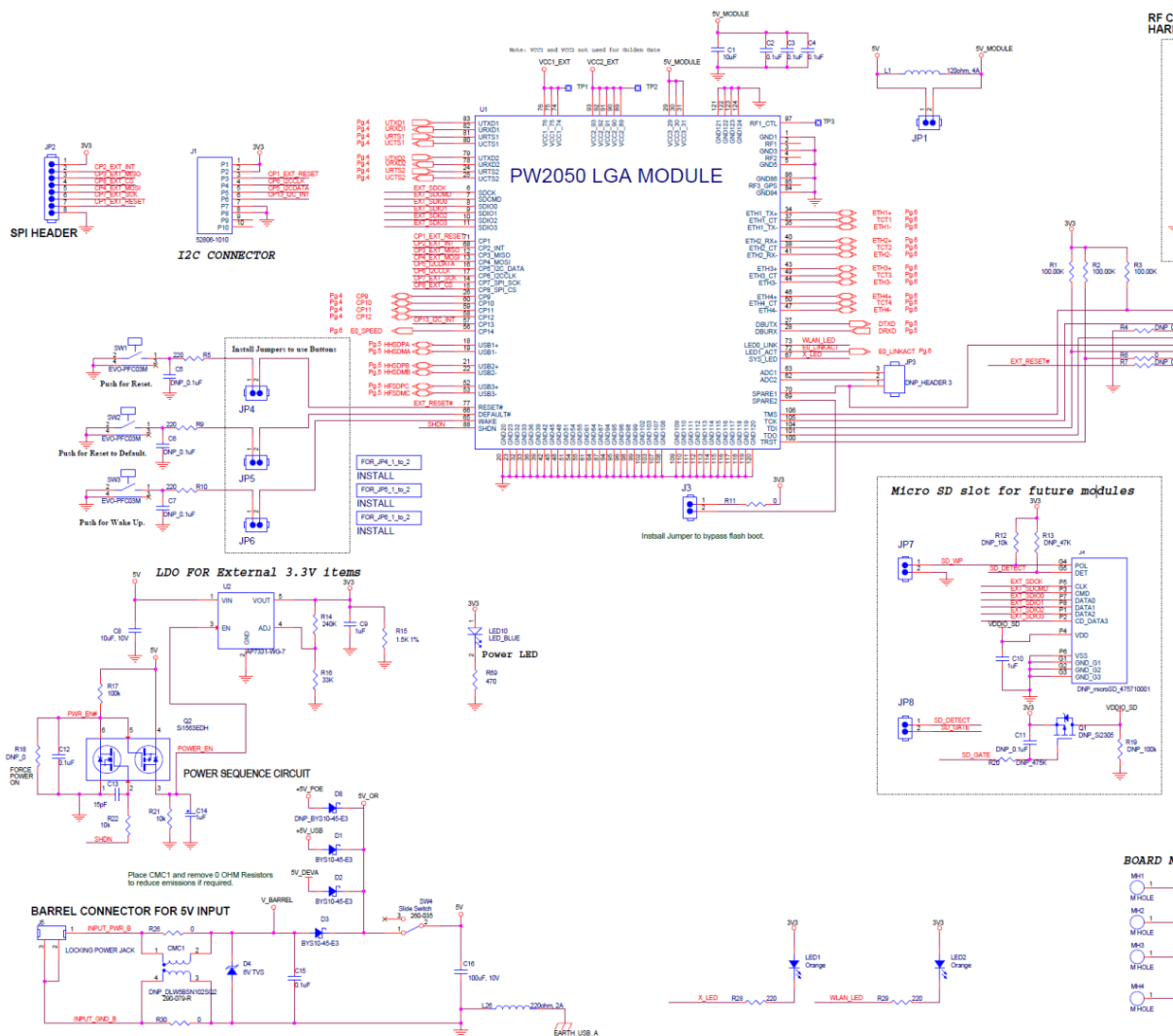




Figure 2-3 Evaluation Board Schematic Part 2 of 4

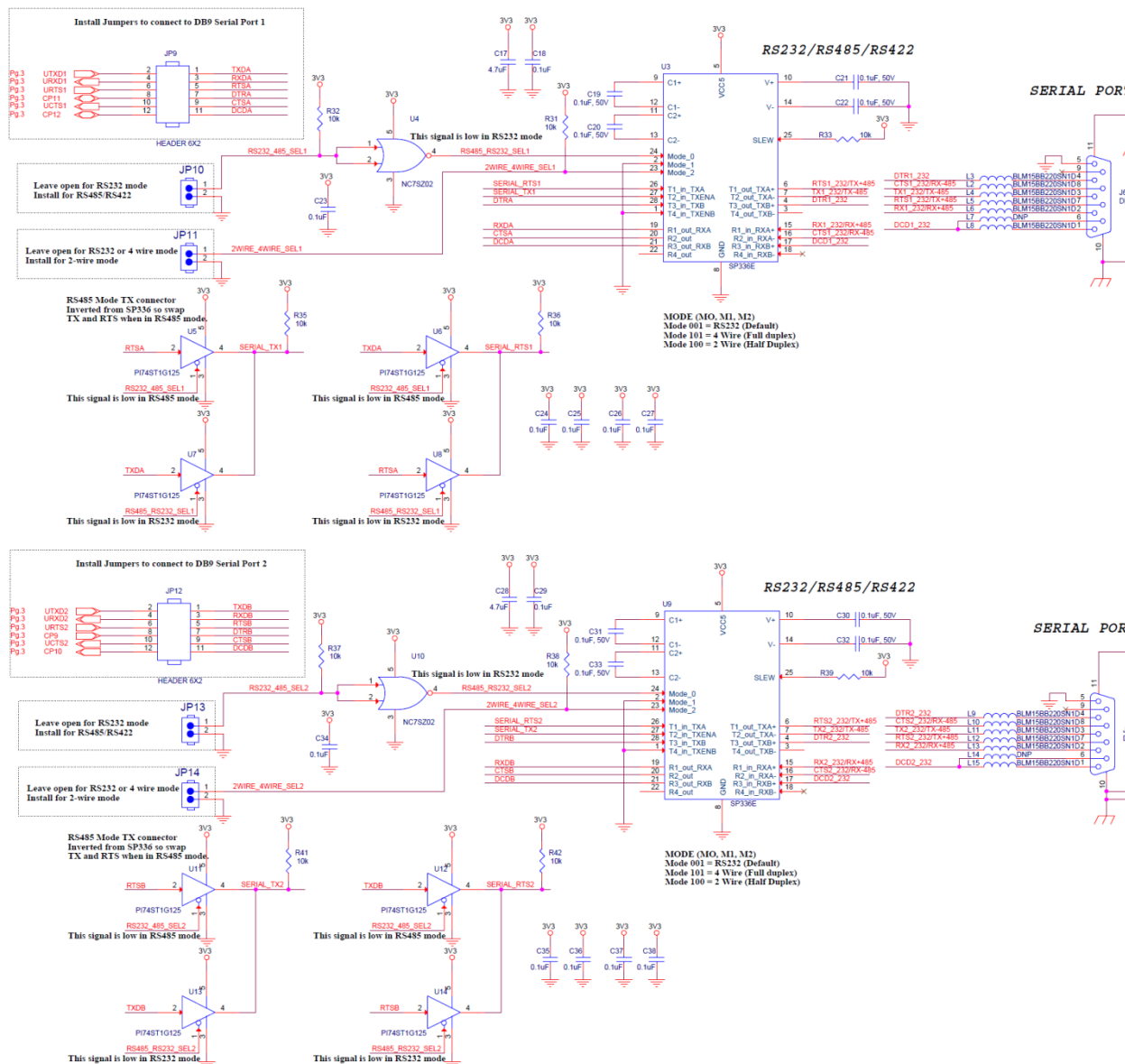


Figure 2-4 Evaluation Board Schematic Part 3 of 4

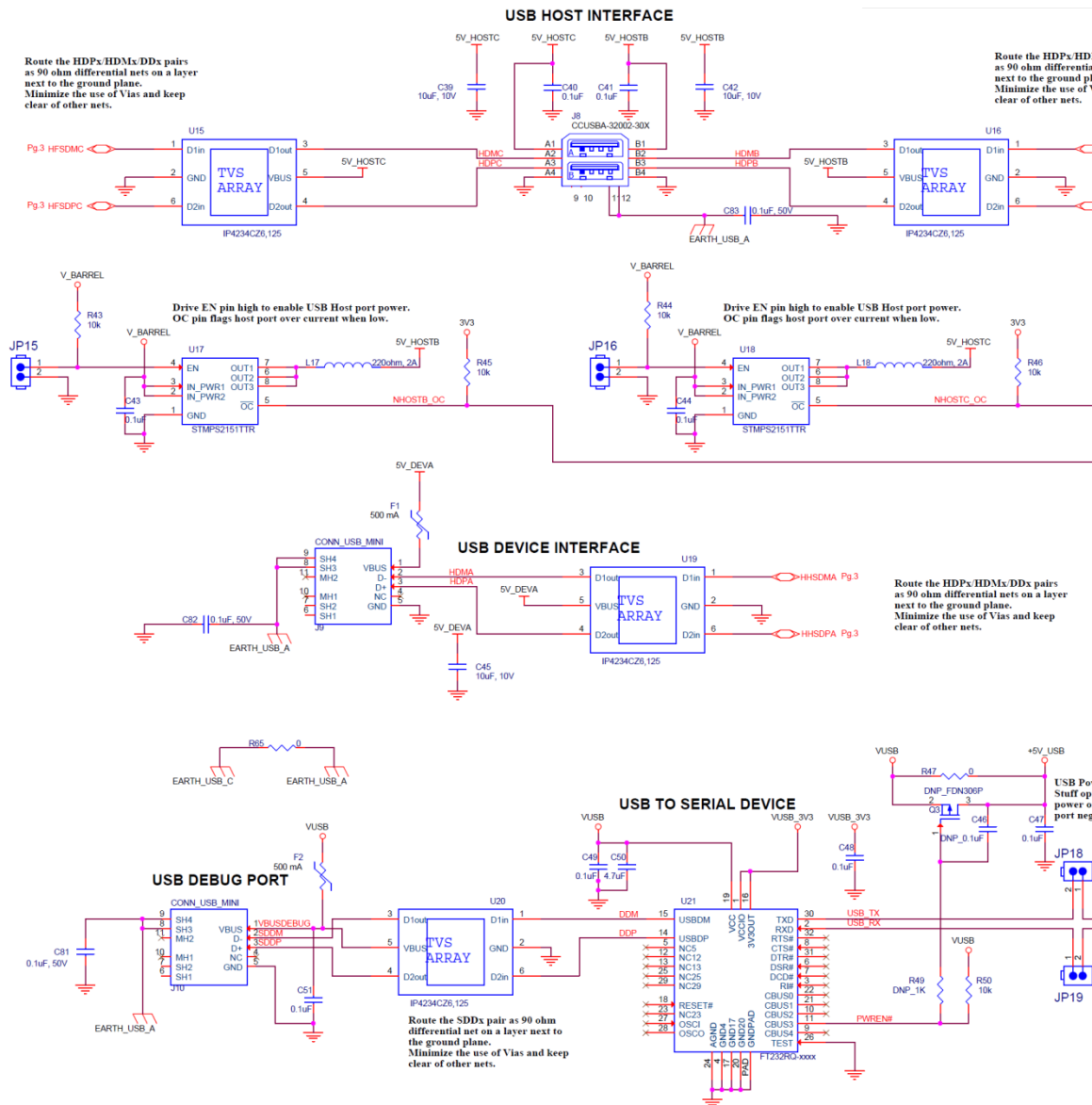
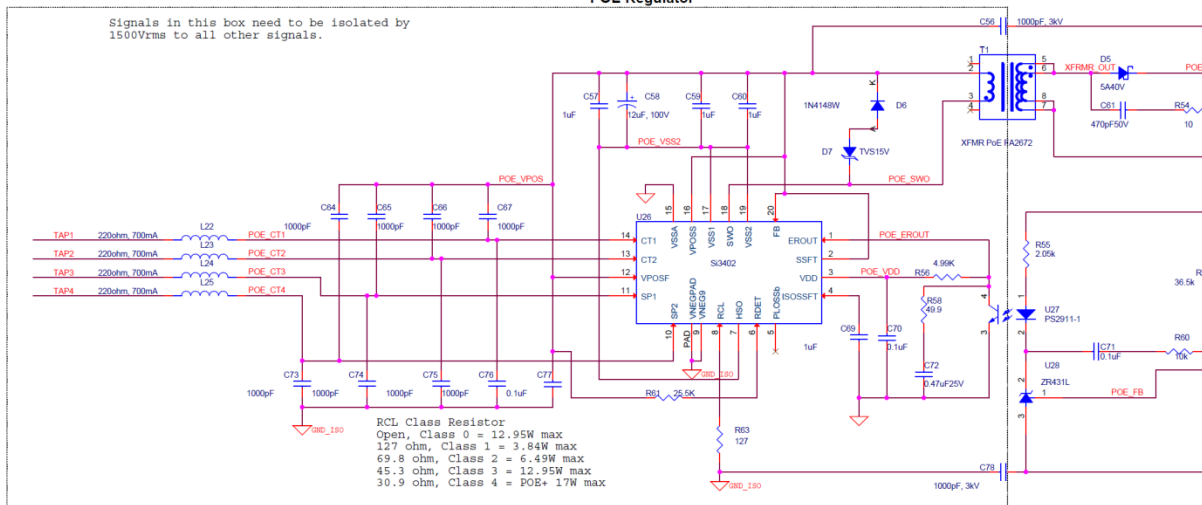
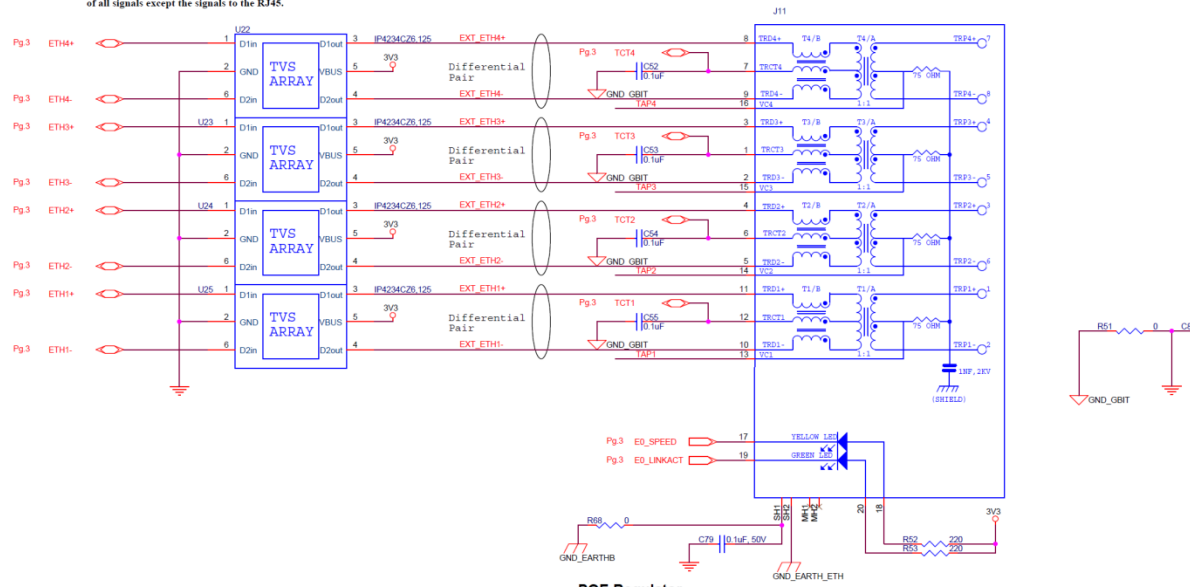


Figure 2-5 Evaluation Board Schematic Part 4 of 4

Route the ETHx+ / ETHx- pairs as 100 ohm differential nets on a layer next to the ground plane. Minimize the use of Vias and keep clear of other nets. Use 20 mill trace on TCTLs. Void area under RJ Jack of all signals except the signals to the RJ45.

**ETHERNET POE MAG JACK**  
Gigabit Mag Jack used for compatibility with future Gigabit modules



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