

BRD-EXP-PLLU3PI-ZB

Robot Peripheral Board

Technical Manual

Date: September 01, 2010

Document Revision: 1.01



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BRD-EXP-PLLU3PI-ZB Technical Manual. No part of this work may be reproduced in any manner without written permission of BiPOM Electronics.

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WARRANTY:

BiPOM Electronics warrants BRD-EXP-PLLU3PI-ZB for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to BRD-EXP-PLLU3PI-ZB. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

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1. Overview

BRD-EXP-PLLU3PI-ZB Robot Peripheral Board is a multi function peripheral expansion board for the popular Pololu 3pi robot. BRD-EXP-PLLU3PI-ZB adds the following capability to the 3pi robot:

- Zigbee wireless option
- Large prototyping area for user circuitry
- Easy access to 3pi LCD, Charger and expansion connectors
- Ability to plug a large range of BiPOM peripheral and microcontroller boards to 3pi

2. Specifications

BRD-EXP-PLLU3PI-ZB board has the following configuration:

- Dual row 14-pin header for connecting to 3pi expansion connector
- Dual row 14-pin header for connecting to 3pi LCD connector
- Single row 2-pin header for connecting to 3pi charger connector
- Dual row 20-pin header for connecting to BiPOM peripheral and microcontroller boards
- Wireless module socket for XBee® Zigbee modules
- 3.3V regulator for XBee® Zigbee modules
- 0.1" spacing prototyping area
- Dimensions are 3.71 inches in diameter (9.43 centimeters). It is a circular board.
- 0° - 70° C operating, -40° - +85° C storage temperature range.
- Optional 5V regulator section (not populated).

3. Functional Blocks

Figure 1 shows the block diagram of the BRD-EXP-PLLU3PI-ZB board:

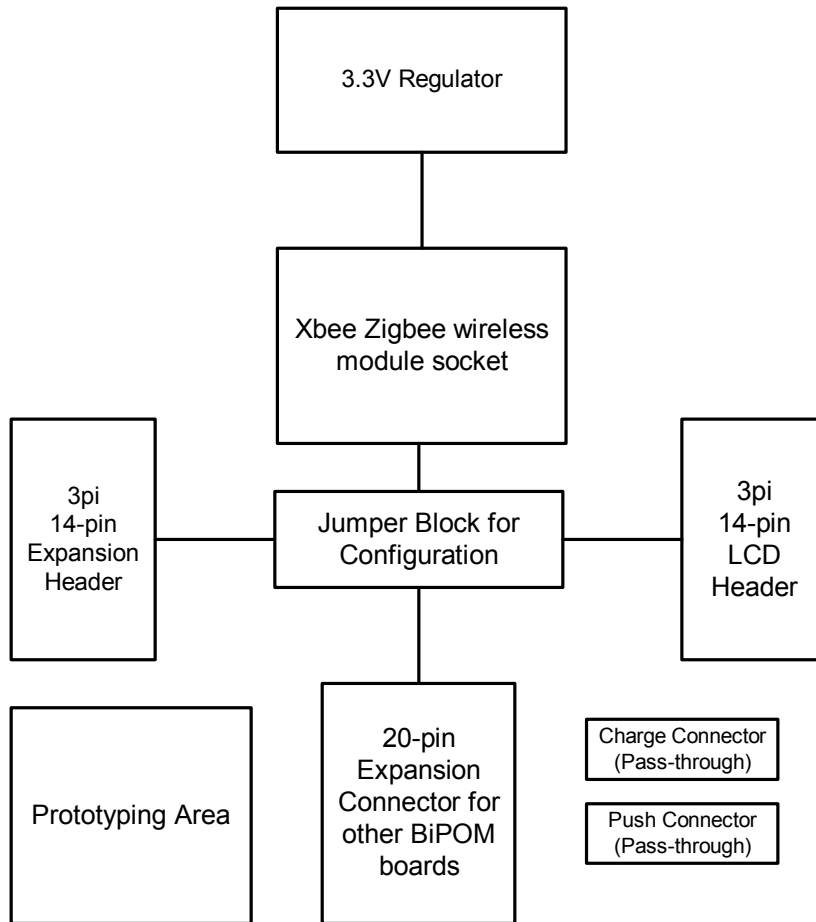


Figure 1

BRD-EXP-PLL3PI-ZB can be configured for the following modes:

Robot Wireless Mode

In this mode, an XBee® Zigbee module is installed on BRD-EXP-PLL3PI-ZB. 3pi robot communicates with a PC, other robots and/or other wireless devices using the Zigbee module.

Figure 2 shows the jumpers to be installed for this mode:

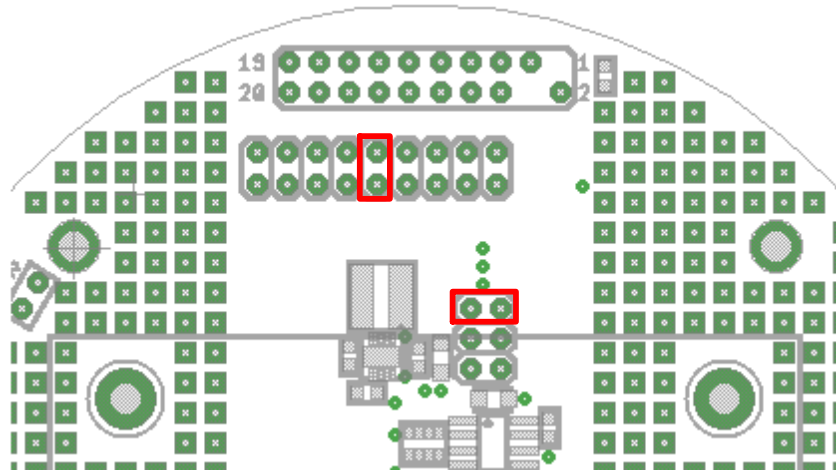


Figure 2

Please refer to the **3pi Robot Complete Quick Start Guide** on BiPOM website for details of this mode.

Microcontroller Mode

In this mode, a BiPOM microcontroller board is installed on BRD-EXP-PLL3PI-ZB. BiPOM microcontroller board communicates with and controls the 3pi robot either through UART, I2C or SPI interface. XBee® Zigbee module is not installed.

Figure 3 shows the jumpers to be installed for Microcontroller Mode using UART:

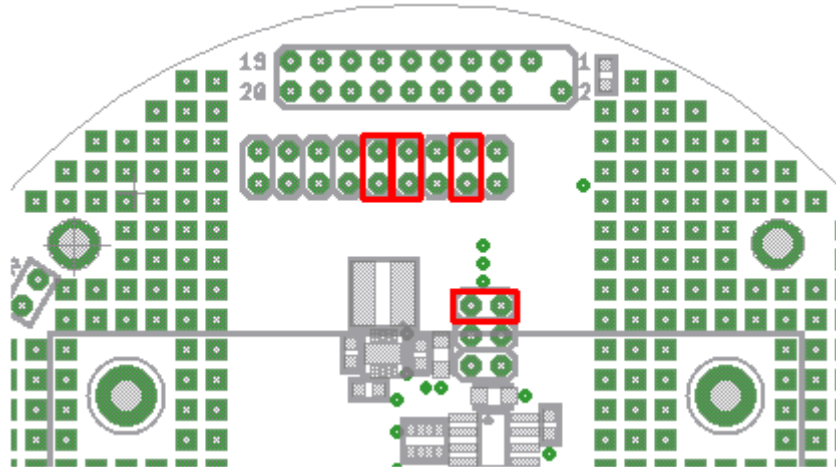


Figure 3

Figure 4 shows the jumpers to be installed Microcontroller Mode using I2C:

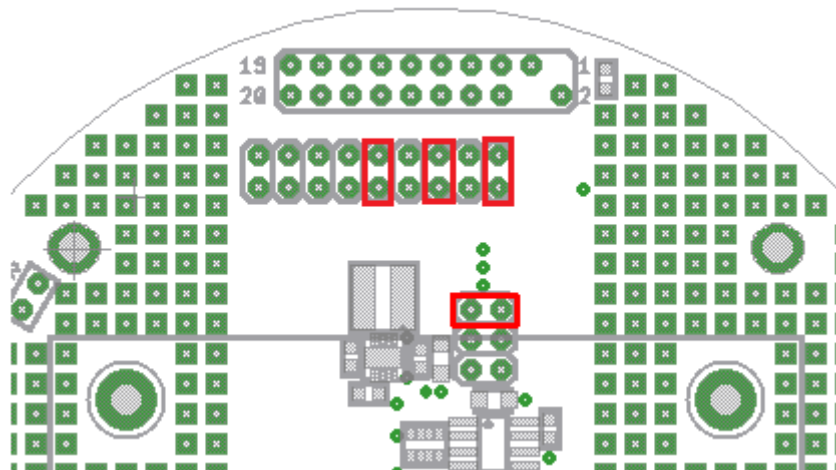


Figure 4

Figure 5 shows the jumpers to be installed Microcontroller Mode using SPI:

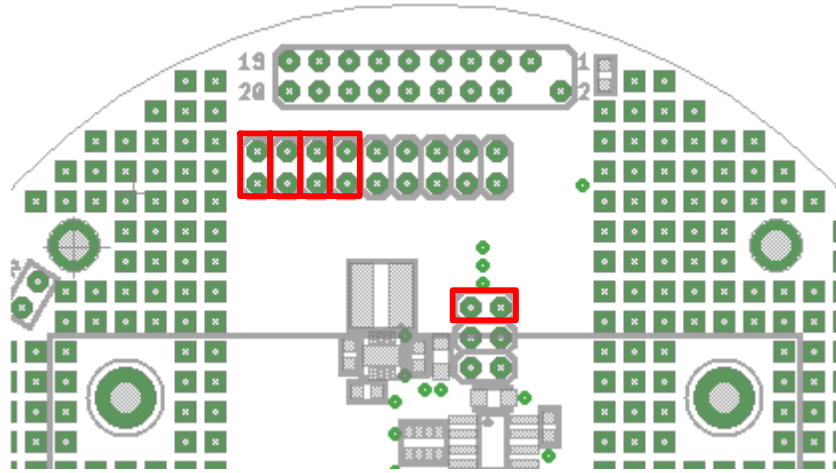


Figure 5

Peripheral Mode

In this mode, one or more BiPOM peripheral boards are installed on the BRD-EXP-PLLU3PI-ZB . 5V power for the peripheral board comes from 3pi robot. 3pi robot communicates with the peripheral board using I2C or SPI interface. XBee® Zigbee module is not installed.

Figure 6 shows the jumpers to be installed for Peripheral Mode using I2C:

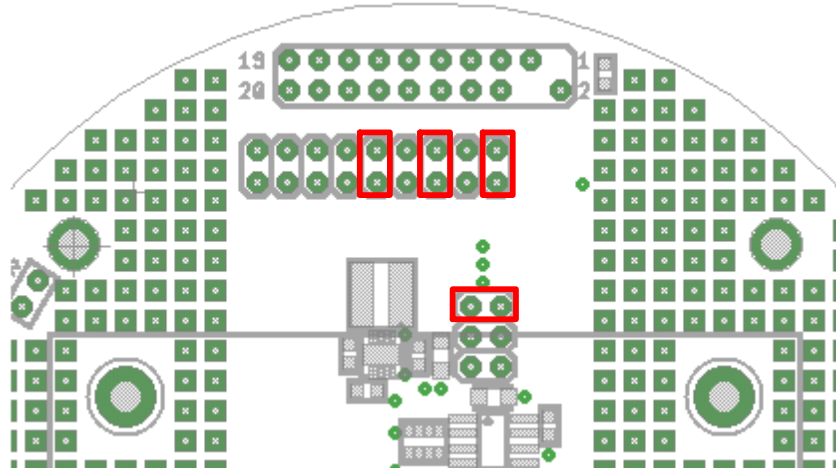


Figure 6

Figure 7 shows the jumpers to be installed for Peripheral Mode using SPI:

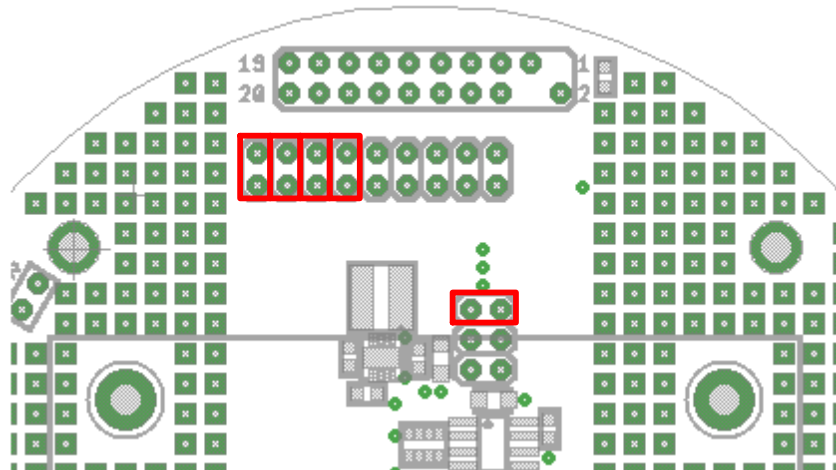


Figure 7

Peripheral Mode with Wireless

In this mode, one or more BiPOM peripheral boards are installed on the BRD-EXP-PLLU3PI-ZB . 5V power for the peripheral board comes from 3pi robot. 3pi robot communicates with the peripheral board using secondary I2C or SPI interface. XBee® Zigbee module is also installed. Communications between XBee® module and 3pi robot is through primary I2C.

In this mode PD2 port pin from 3pi robot is the I2C Clock (SCL) and the PD4 port pin from 3pi robot is the I2C Data (SDA) to communicate with BiPOM peripheral boards. This secondary I2C interface is implemented in software on the 3pi robot.

Figure 8 shows the jumpers to be installed for this mode:

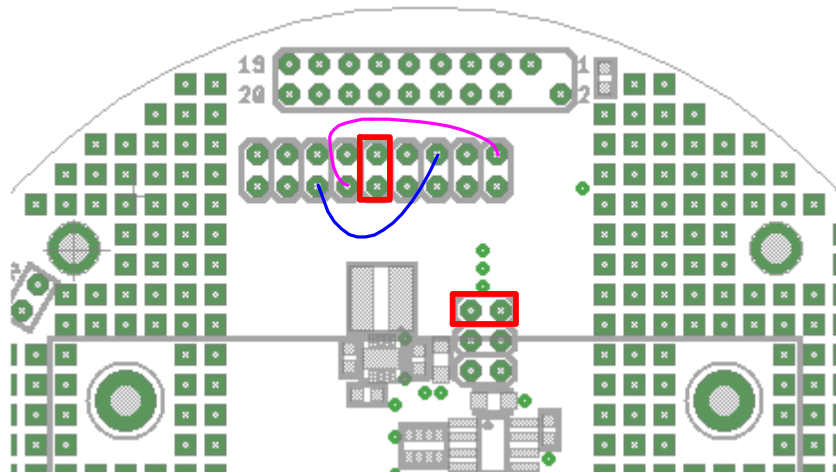


Figure 8

Jumpers

Table 1 shows the jumper assignments:

Name	Operations if installed
X2	When installed, provides 5V power to BRD-EXP-PLLU3PI-ZB from 3pi robot's expansion connector.
X3	When installed, connects 3pi robot's serial transmit pin to XBee® module's data input. This allows the robot to send data through the wireless.
X5	When installed, connects a BiPOM microcontroller board's serial transmit pin to XBee® module's data input. This allows the microcontroller board to send data through the wireless.
X7	When installed along with X3, connects the 3pi Transmit output (3PI_TXD) to SCL line of BiPOM peripheral boards. This allows the 3pi robot to access some BiPOM peripherals using the I2C 2-wire serial interface.
X8	When installed, connects a BiPOM microcontroller board's serial receive pin to XBee® module's data output. This allows the microcontroller board to receive data through the wireless. (3pi robot always receives the same data from the wireless).
X9	When installed, connects the 3pi Receive input (3PI_RXD) to SDA line of BiPOM peripheral boards. This allows the 3pi robot to access some BiPOM peripherals using the I2C 2-wire serial interface.
X10	When installed, connects PC6 port pin from the 3pi robot to Reset input of XBee® module. This allows the robot to be able to reset XBee®, if needed, under software control.
X14	When installed, connects PB5 port pin from the 3pi robot to pin 14 (SCK – Serial Clock) of BiPOM Expansion connector. This allows the 3pi robot to access some BiPOM peripherals using the SPI serial interface.
X15	When installed, connects PB4 port pin from the 3pi robot to pin 13 (MOSI – Serial Data Input to peripheral) of BiPOM Expansion connector. This allows the 3pi robot to access some BiPOM peripherals using the SPI serial interface.
X16	When installed, connects PD4 port pin from the 3pi robot to pin 15 (CS – Chip Select) of BiPOM Expansion connector. This allows the 3pi robot to access some BiPOM peripherals using the SPI serial interface.
X17	When installed, connects PD2 port pin from the 3pi robot to pin 17 (MISO – Serial Data Output from peripheral) of BiPOM Expansion connector. This allows the 3pi robot to access some BiPOM peripherals using the SPI serial interface.

Table 1

Power Supply

BRD-EXP-PLLU3PI-ZB powers from the 3pi robot. 5 Volts from 3pi Expansion Connector is fed to the 3.3V regulator to power the XBee® Zigbee module. 5 Volts is also used for powering the BiPOM peripheral and/or microcontroller boards that may be plugged to BRD-EXP-PLLU3PI-ZB.

4. Board Layout

Layout of the BRD-EXP-PLLU3PI-ZB board is shown in Figure 9 below:

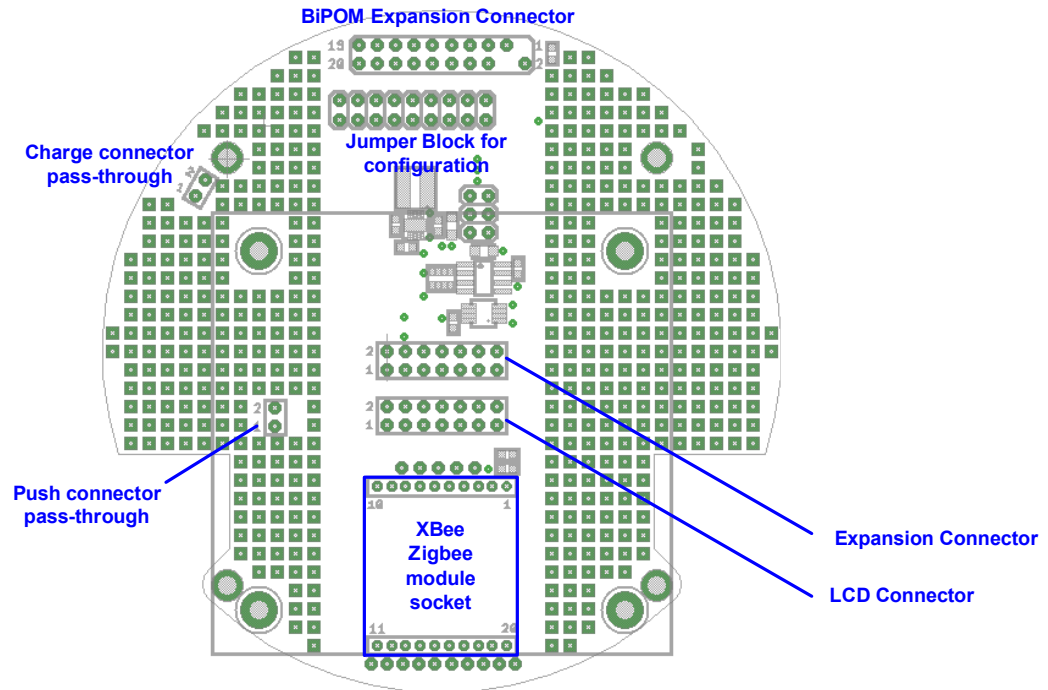


Figure 9

Connector pinout of the BRD-EXP-PLLU3PI-ZB board is shown in Figure 10 below:

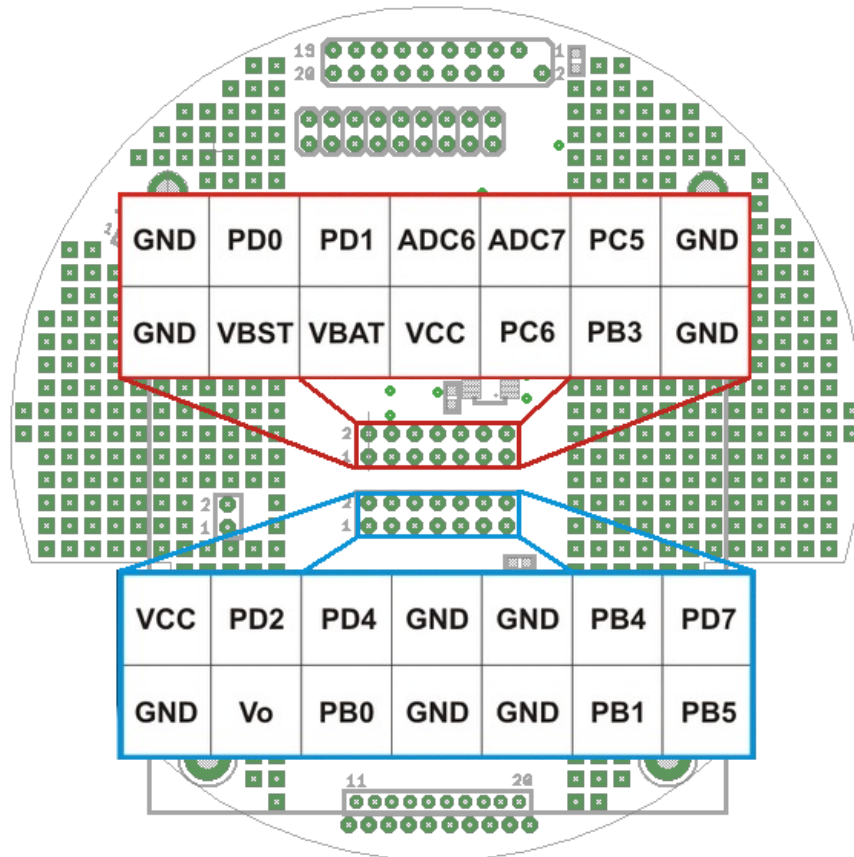
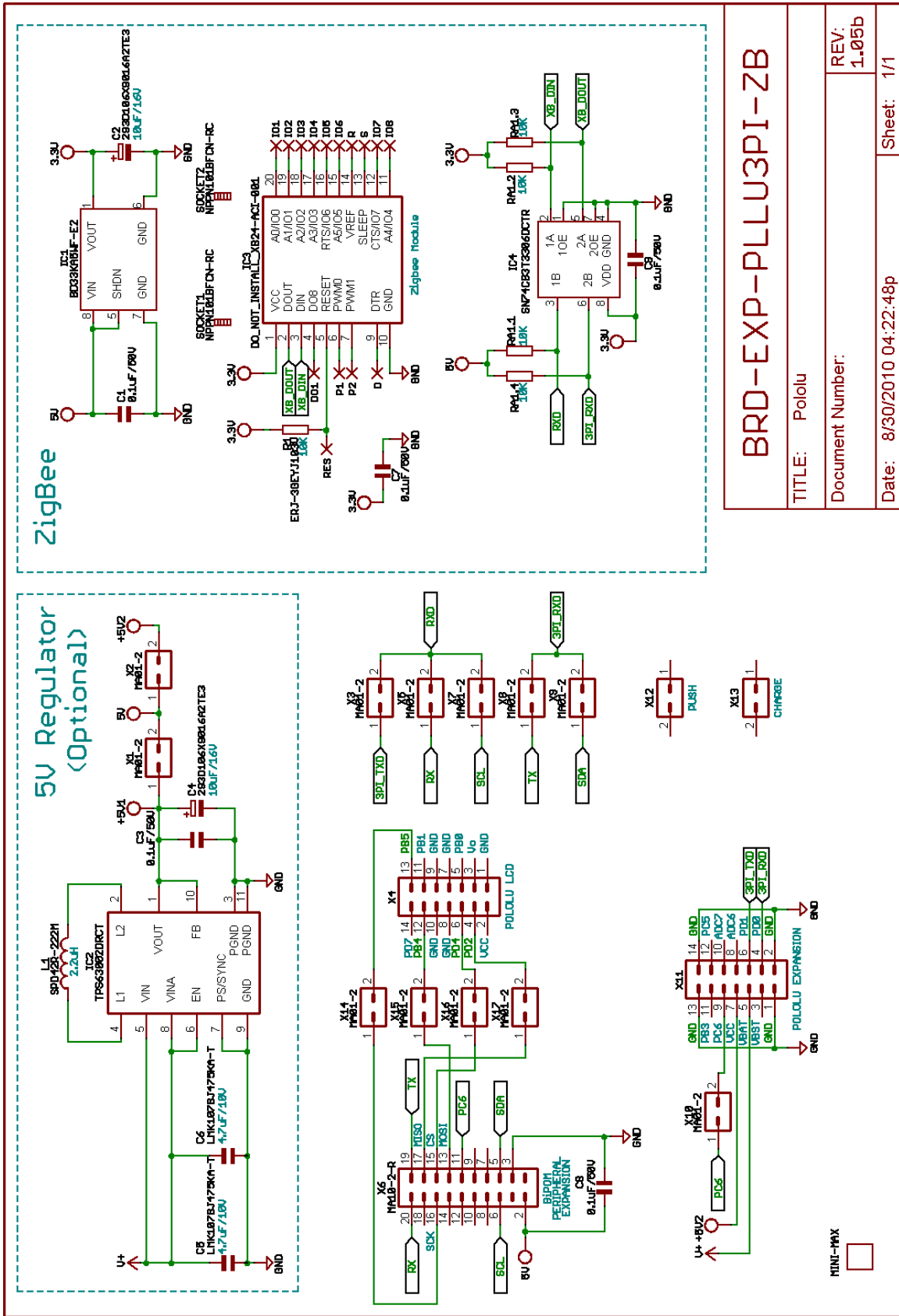


Figure 10

5. Schematics



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