Break Out Board User Manual

Contents

PORT A

PORT A has three purposes:

1. Analog Input (ADC0-7). PA0(ADC0) is connected to the potentiometer through PORTA_SW1. To enable the potentiometer, PORTA_SW1 needs to be set properly. The first two switches need to be turned ON (labeled 0&1 on the silkscreen), this leaves PORTA floating. If these are enabled, the analog input will be pulled to ground. Next to use the potentiometer, enable switch 2.
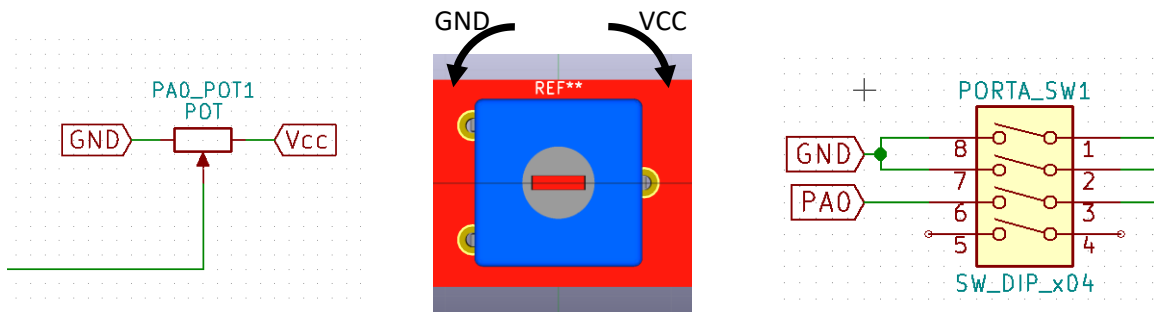
2. LED Output. LED0-LED7 are connected to PA0-PA7 through 1k Ohm resistors. To complete the circuit, giving the LEDs a path to ground, PORTA_SW1 0 must be enabled. If LED0 does not turn ON/OFF properly, turn off PORTA_SW1 2.
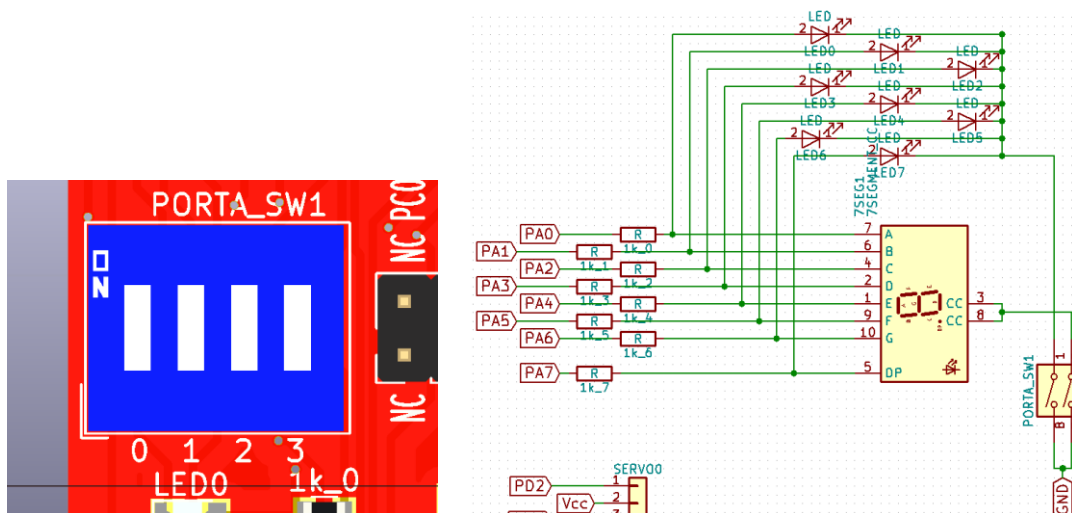
3. Seven Segment Display. The LEDs inside this KCS02 package use the same current limiting 1k Ohm resistors as the 8 individual LEDs. This is a common cathode (CC) device. To enable the SSD, set PORTA_SW1 1 to ON. Disable PORTA_SW1 2 if segment A is not working properly.
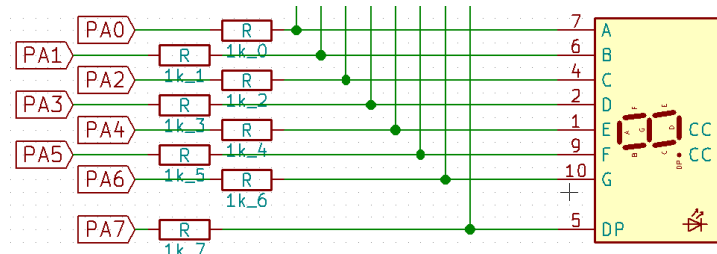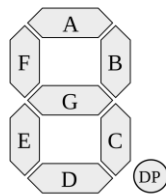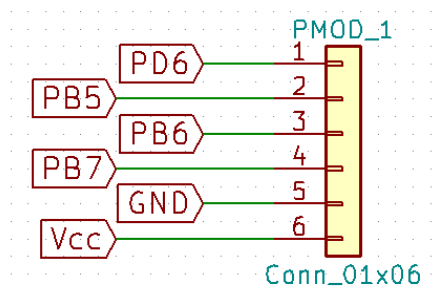

PORT B

PORT B has two purposes:

1. DIP Switch. This switch connects PB0-PB7 to ground when enabled. Remember to use the internal pull up resistors when using this input.
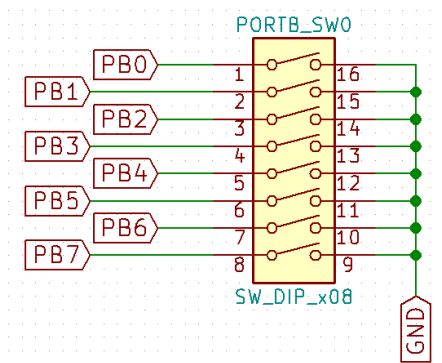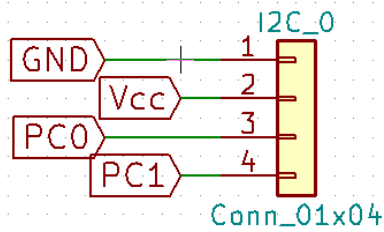

2. PMOD. The ATmega324PB uses PB5-PB7 for the SPI communications. When using this header, disable the corresponding switches on PORT B to leave them floating.

PORT C

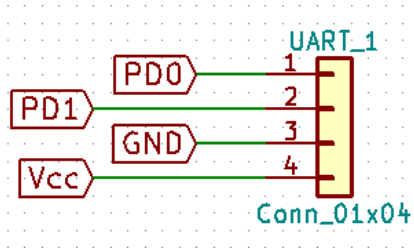1. I2C Interface. PC0 and PC1 are used for hardware I2C communications in the ATmega 324PB. VCC is 3.3V.

```
                              I2C_0
  ┌─────┐           1 ┌──┐
  │ GND ├─────┼───────┤  │
  └─────┘   ┌─────┐ 2 │  │
            │ Vcc ├────┤  │
  ┌─────┐   └─────┘ 3 │  │
  │ PC0 ├─────────────┤  │
  └─────┘   ┌─────┐ 4 │  │
            │ PC1 ├────┤  │
            └─────┘    └──┘
                    Conn_01x04
```

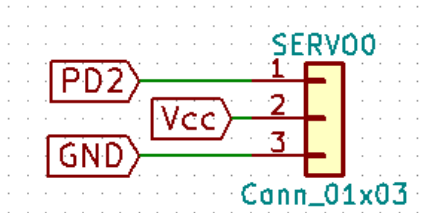2. PC2-5 are used for JTAG communications and can not be accessed by default.

PORT D

Port D has four purposes:

1. UART Interface. PD0 and PD1 are used for hardware UART communications in the ATmega 324PB. VCC is 3.3V.

```
                              UART_1
            ┌─────┐   1 ┌──┐
            │ PD0 ├──────┤  │
  ┌─────┐   └─────┘ 2 │  │
  │ PD1 ├─────────────┤  │
  └─────┘   ┌─────┐ 3 │  │
            │ GND ├────┤  │
  ┌─────┐   └─────┘ 4 │  │
  │ Vcc ├─────────────┤  │
  └─────┘             └──┘
                    Conn_01x04
```

2. Servo Motor. PD2 is used to control the servo through PWM. VCC is 3.3V.

```
                              SERVO0
  ┌─────┐           1 ┌──┐
  │ PD2 ├─────────────┤  │
  └─────┘   ┌─────┐ 2 │  │
            │ Vcc ├────┤  │
  ┌─────┐   └─────┘ 3 │  │
  │ GND ├─────────────┤  │
  └─────┘             └──┘
                    Conn_01x03
```

3. PMOD. PD6 is used as the slave select line for the hardware PMOD communications in the ATmega 324PB.

```
                              PMOD_1
            ┌─────┐   1 ┌──┐
            │ PD6 ├──────┤  │
  ┌─────┐   └─────┘ 2 │  │
  │ PB5 ├─────────────┤  │
  └─────┘   ┌─────┐ 3 │  │
            │ PB6 ├────┤  │
  ┌─────┐   └─────┘ 4 │  │
  │ PB7 ├─────────────┤  │
  └─────┘   ┌─────┐ 5 │  │
            │ GND ├────┤  │
  ┌─────┐   └─────┘ 6 │  │
  │ Vcc ├─────────────┤  │
  └─────┘             └──┘
                    Conn_01x06
```
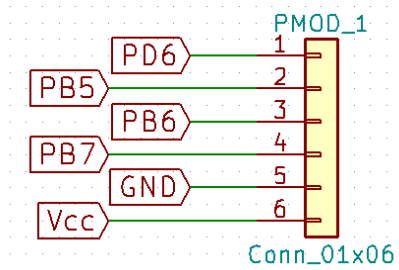
4. **PING Sensor.** The ping sensor requires 5V power. A female to female jumper wire can be used to get 5V from the USB input to the XPLAINED board.
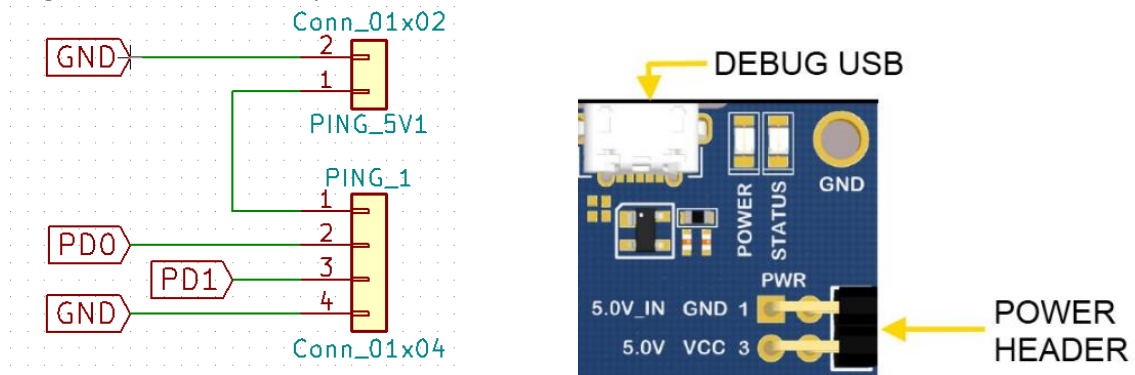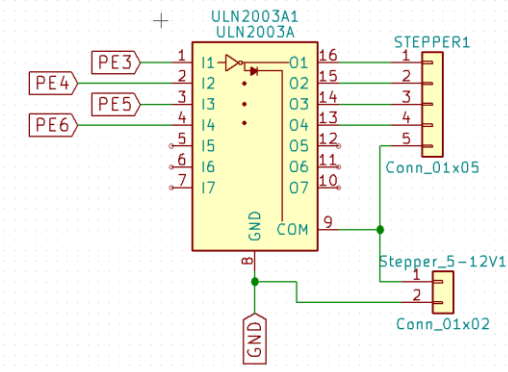

PORT E

Port E has two purposes:

1. **DC Motor.** PE2 is connected to a 4N28 opto-isolator. This IC prevents noise and feedback from being introduced. A PNP Darlington transistor is used to amplify the signal. An external power source is needed.
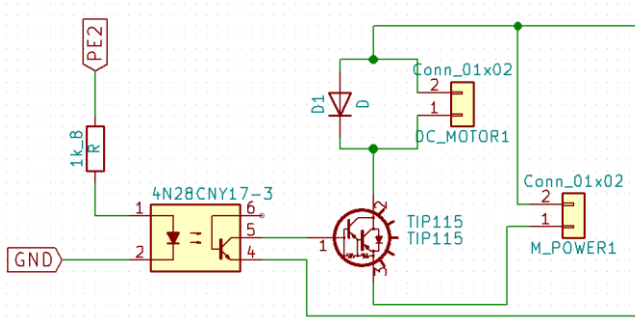
2. **Stepper Motor.** PE3-6 are connected to the ULN2003A IC. This IC amplifies the signals. An External power source is needed. 5V is the minimum and 12V is the maximum.

PCB Layers

Front Copper Layer

Back Copper Layer

Back Silkscreen Layer
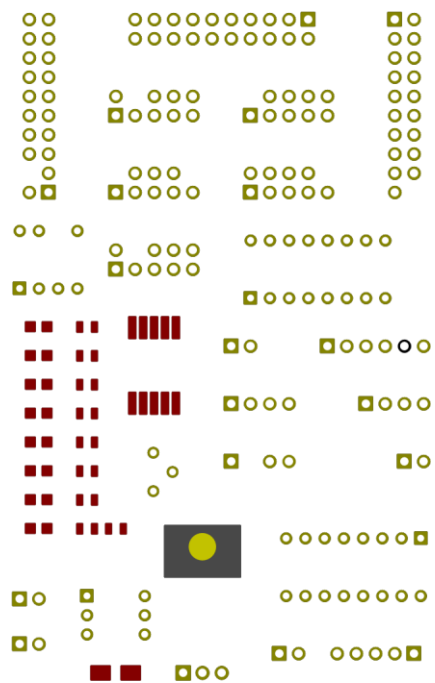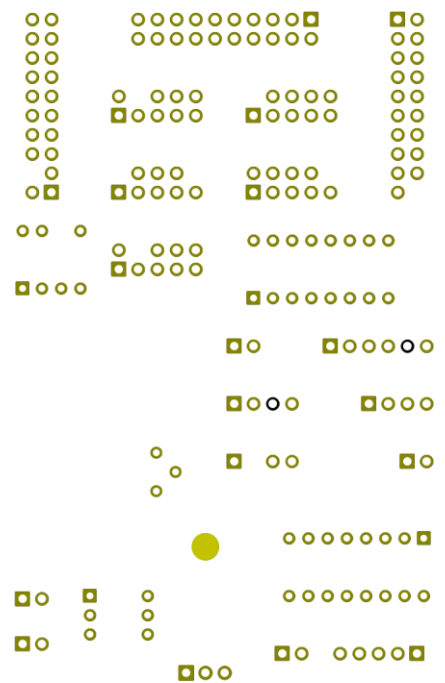

Front Silkscreen Layer

Front Solder Mask Layer

Bottom Solder Mask Layer

Designed using KiCad, a free and open source EDA.