

8:1 Serial Port Expander

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V 1.9

This is an evolving document
check back for updates.

Features

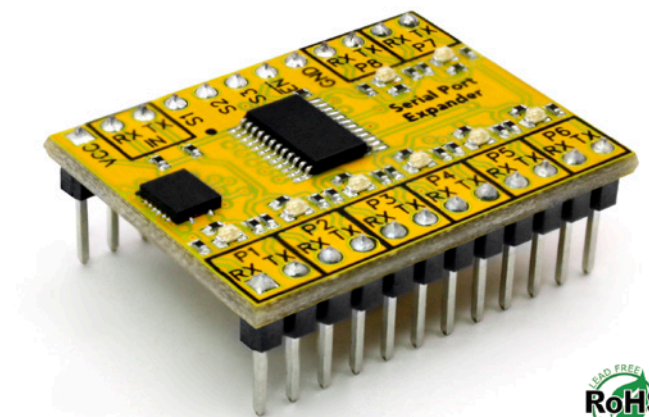
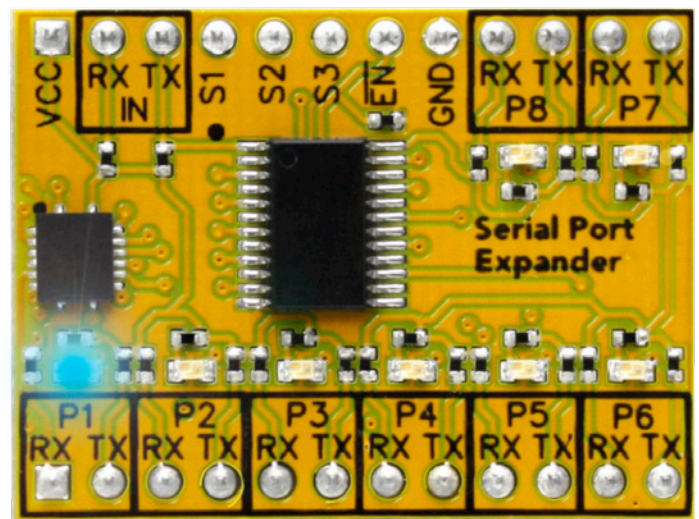
- Expand a single UART (RX / TX) serial port into 8 additional serial ports
- On-board LEDs indicate which channel has been opened
- Supports baud rates greater than 1M Baud
- Easily connect two Serial Port Expanders together to get 16 additional serial ports

Operating voltage

- 3.3V to 5V

Power consumption

- 0.8mA at 3.3 volts
- 3mA at 5 volts



Description

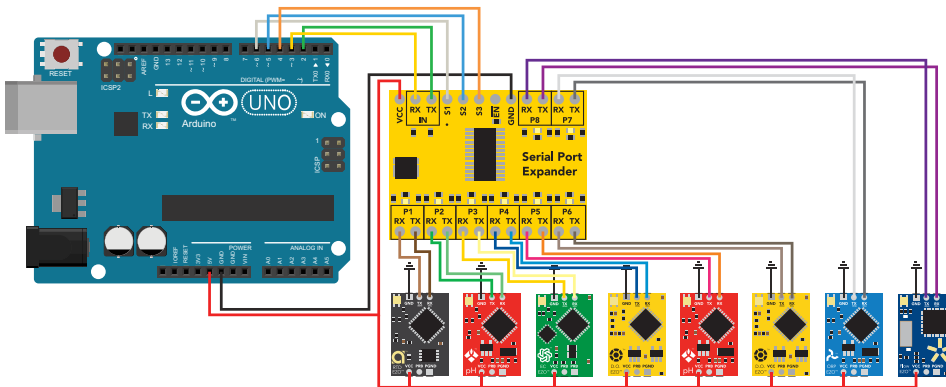
The Atlas Scientific™ 8:1 Serial Port Expander, enables the user to easily expand one hardware serial port into 8 serial ports. The on-board LEDs provide the user with a simple way of identifying which one of the 8 serial ports is opened.

System overview

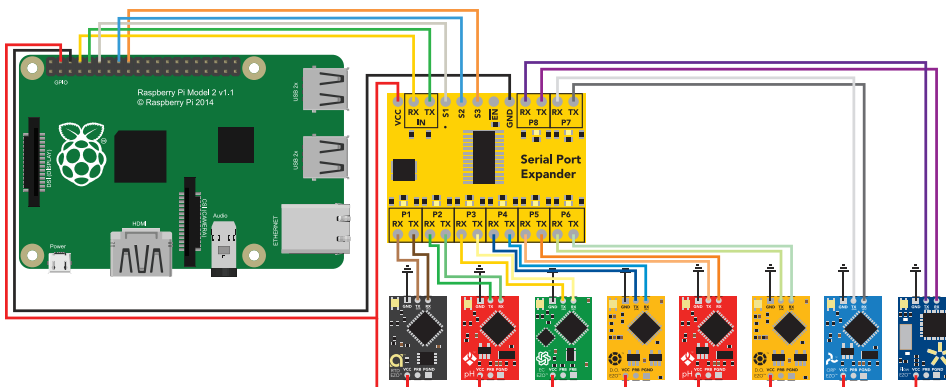
The Atlas Scientific™ 8:1 Serial Port Expander has been designed to help the embedded systems engineer easily add an expanded number of UART serial ports to a microcontroller that does not have enough ports for its intended application.

The microcontroller's UART is connected to the port expander and the serial signal is then routed to one of the new ports. Controlling what port the signal is routed to is done through a simple 3 pin binary switch.

This device will use 3 GPIO pins from your microcontroller to operate properly



Expanding an Arduino Uno's single serial port to 8 serial ports.



Expanding a Raspberry Pi's single serial port to 8 serial ports.

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Device operation

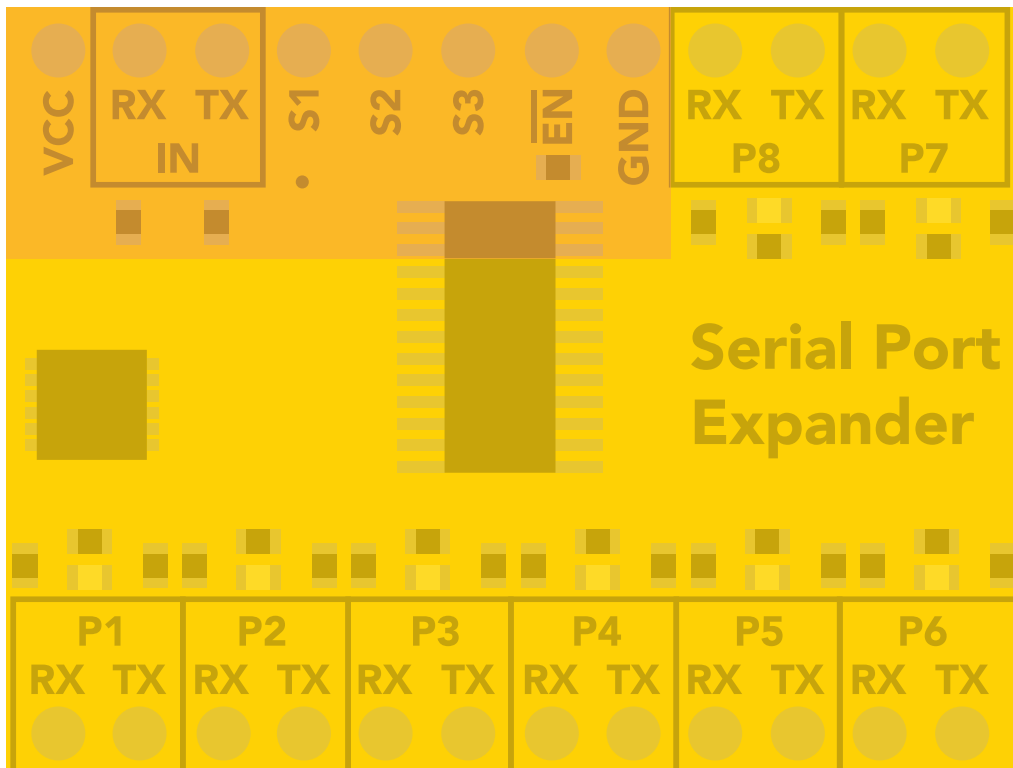
Max baud rate 1M baud
Power 3.3V to 5.0V

Power consumption
 5V = 3mA
 3.3V = 0.8mA

	MIN	TYP	MAX
Storage temperature	-65 °C		150 °C
Operational temperature	-40 °C	25 °C	85 °C
VCC	3.3V	5V	5.5V

The on board LEDs can not be disabled

The Atlas Scientific™ 8:1 Serial Port Expander is broken up into two sections, a control section and an output section.

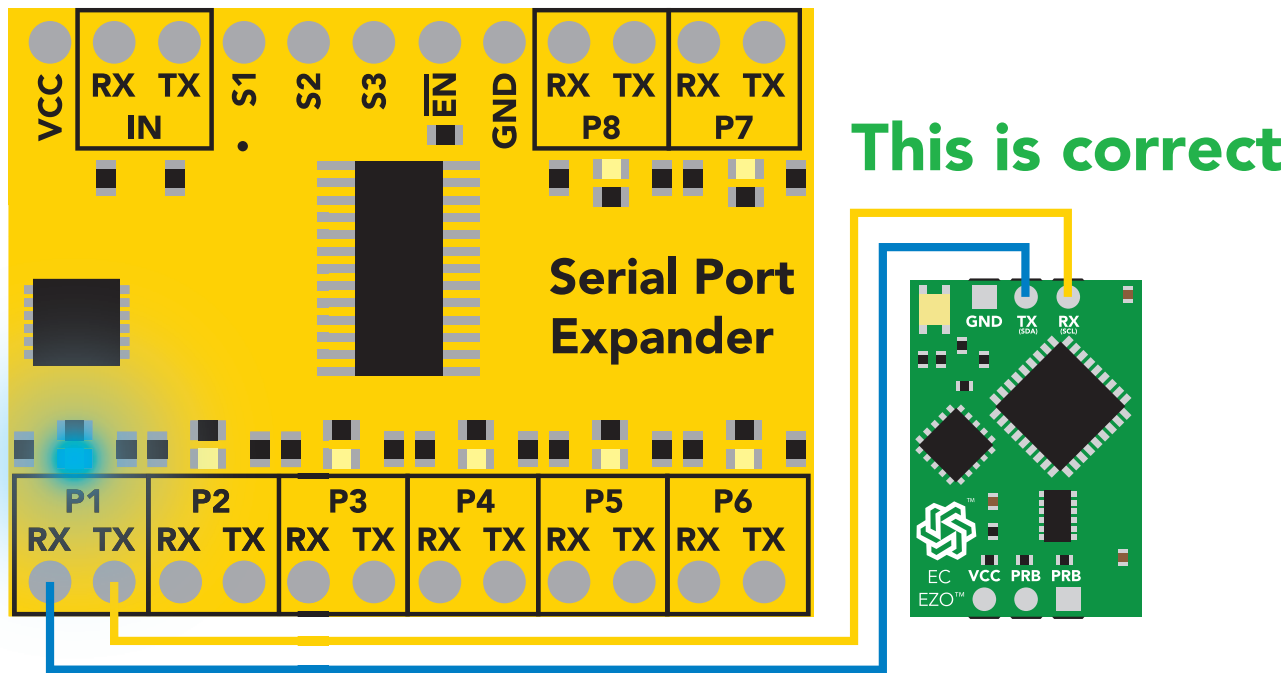


 **Control section**  **Output section**

Output section

The output section consists of eight output ports. These ports are marked **P1 – P8**

Each of these eight output ports consist of an RX and TX pin. Each one of these RX/TX pins connects to your peripheral device, like this:



Control section

VCC	Supply voltage (3.3V to 5V)
RX	Data in
TX	Data out
S1	Output direction control 1
S2	Output direction control 2
S3	Output direction control 3
EN	Enable
GND	Supply ground

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VCC and ground

VCC can be as high as 5 volts.

Keep VCC and GND tied to the main power bus of your system.

RX / TX



The main RX and TX input pins are connected to the microcontrollers TX and RX pins respectively.

S1, S2 and S3

S1 – S3 are the control switches (pins) which guide the RX and TX signals to the correct output section. All that is needed to guide the RX/TX signal to 1 of the 8 available ports is to set the S1 – S3 pins high or low. The combination of the S1 – S3 pin state is not arbitrary. It is the equivalent of binary 0 to binary 7. Atlas Scientific has chosen to name the expanded ports P1 – P8 however, they are address by setting S1 – S3 using the binary numbers 0 – 7.

S3	S2	S1	Binary value S3 – S1
0	0	0	0 (000)
0	0	1	1 (001)
0	1	0	2 (010)
0	1	1	3 (011)
1	0	0	4 (100)
1	0	1	5 (101)
1	1	0	6 (110)
1	1	1	7 (111)

Example

To open port eight you would set pins S1, S2 and S3 high (binary 7).

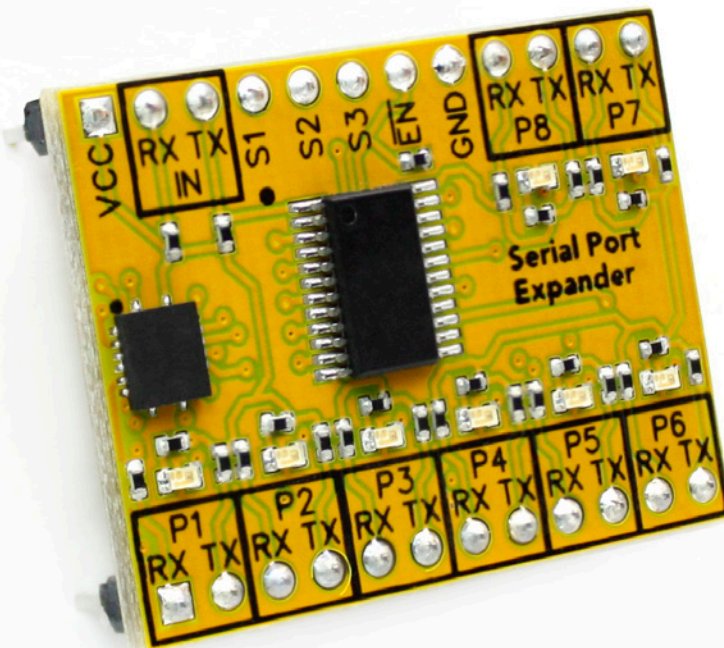
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EN pin

If this feature is not being used, you can leave the EN pin floating. In previous versions of the Serial port expander this pin needed to be connected to GND if it was not being used. This is no longer the case. The pin can be left floating if this feature is not being used.

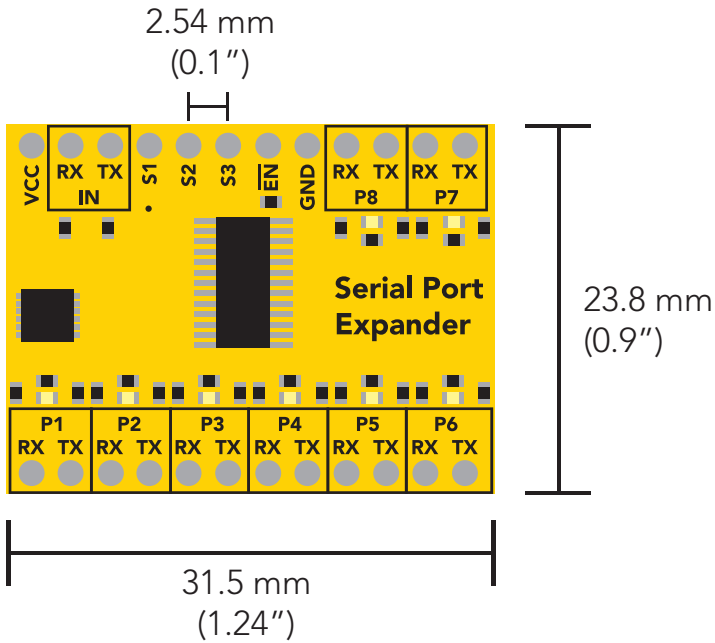


The pin marked "EN" is the enable line. If EN is pulled high (or set to 1 by your microcontroller) the 8:1 Serial Port Expander will not work. At first this may seem unnecessary however, use of the EN pin will allow you to control 16 or more devices with just 1 serial port and two or more 8:1 Serial Port Expanders. [Refer to the Arduino UNO + 2 Serial Port Expander code](#) to see how this is done.

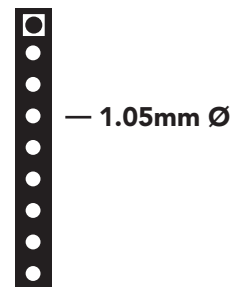


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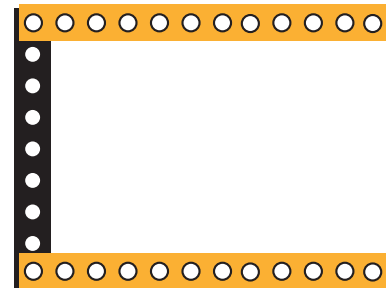
8:1 Serial Port Expander footprint



1. In your CAD software place a 9 position header.



2. Place two, 12 position headers at both left and right of the 9 position header as shown.



3. Once this is done you can delete the Vertical 9 position header. Make sure that the two, 12 position headers are 20.32mm (0.8") apart from each other.

