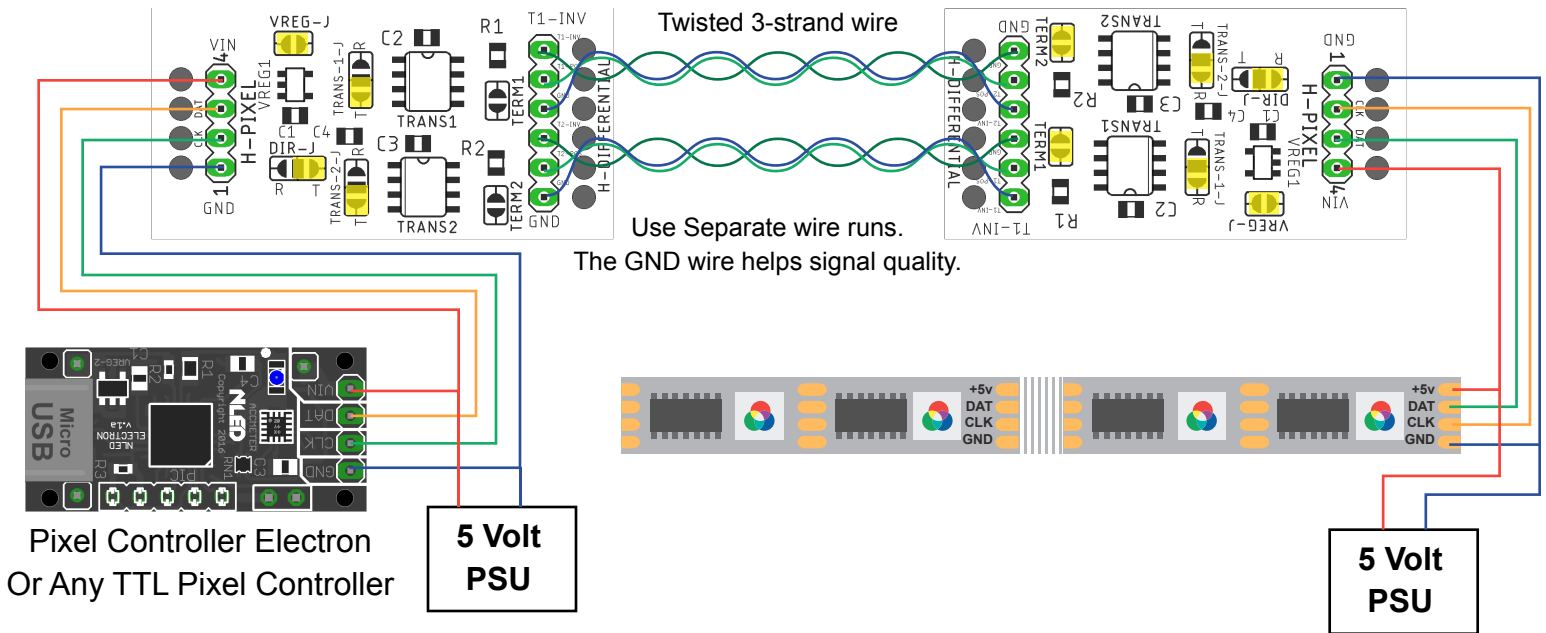# Pixel Differential SPI Board

Converts TTL SPI signals into differential signals and back to TTL SPI. Useful for long distance SPI communication with various LED pixels and other uni-directional SPI devices. Featuring dual in/outs, for either sending clock(CLK) and data(DAT) for synchronous chipsets, or dual data(DAT) in/out for asynchronous chipsets(such as WS2812 and similar).

This device is open hardware relased under a Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). Commerical usage is available for a donation of any amount, contact for details.

Features:

- Supports wide voltage range for both 5 volt and 12 volt type pixels.
- Supports standard SPI(clock and data) or single-wire asynchronous (data)
- Designed for LED Addressable Pixels, but can be used for other SPI networks and similar uses.
- Supports all pixel chipsets. WS2801, WS2811, WS2812, WS2813, APA102, LPD8806, etc.
- Allows pixel data to be transmitted long distances. Depends on wire, enviroment, and chipset.
- Small and cheap.

Fig 1a - Example use with 5 volt pixels and power supply. For 12 volt, do not close the VREG-J jumpers.
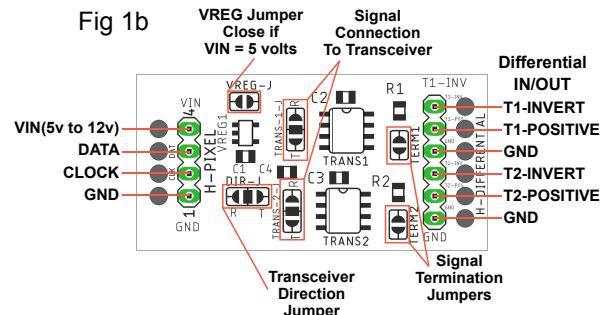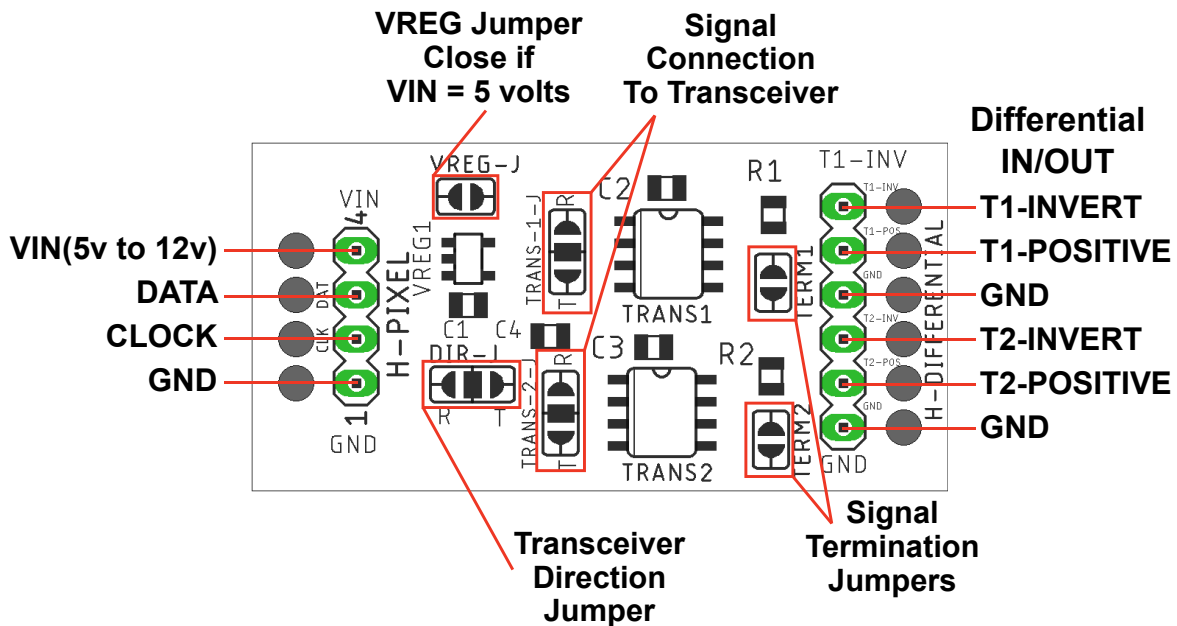

Twisted 3-strand wire

Use Separate wire runs.
The GND wire helps signal quality.

Pixel Controller Electron
Or Any TTL Pixel Controller

5 Volt PSU

5 Volt PSU

Specification:

Input Voltage(VIN)	5 volts*, or 6v to 12v
Logic Current Draw	< 50mA
Inputs/Outputs	Dual Differential Tranciever
Connector Spacing	0.1"/2.54mm
Overall Dimensions	20mm x 40mm

*Must close a jumper to use 5 volt input.

Fig 1b

VREG Jumper
Close if
VIN = 5 volts

Signal
Connection
To Transceiver

Differential
IN/OUT

VIN(5v to 12v)
DATA
CLOCK
GND

T1-INVERT
T1-POSITIVE
GND
T2-INVERT
T2-POSITIVE
GND

Transceiver
Direction
Jumper

Signal
Termination
Jumpers

Datasheet Revision: 1   Firmware Revision: Hardware Revision: 1a

Pinout Continued

Solder Jumper Descriptions

Jumper Settings:

TERM1: Signal termination. Close jumper if that channel is receiving

TERM2: Signal termination. Close jumper if that channel is receiving

DIR-J: Sets transcievers for reception or transmission. Tie center pad to R to set for reception.
    Tie center pad to T for transmission.

TRANS-1-J: Selects transmission or reception for channel #1. Tie to T for transmit, or R for reception

TRANS-2-J: Selects transmission or reception for channel #2. Tie to T for transmit, or R for reception

VREG-J: If using 5 volt power input, close the jumper. If using an input voltage larger than 5 volts, use the

BOM:

2x SN75176BDR - SOIC-8 - or equivalent differential transceiver

1x AP2210K-5.0TRG1 - SOT-23-5 - 5 volt linear regulator

2x 120 ohm resistor - 0805 - termination resistors

1x 1uF to 10uF >=6.3vdc - 0805 - tank capacitance

1x 100pF >=6.3vdc - 0805 - voltage regulator bypass

2x 0.1uF >=6.3vdc - 0805 - transceiver decouple