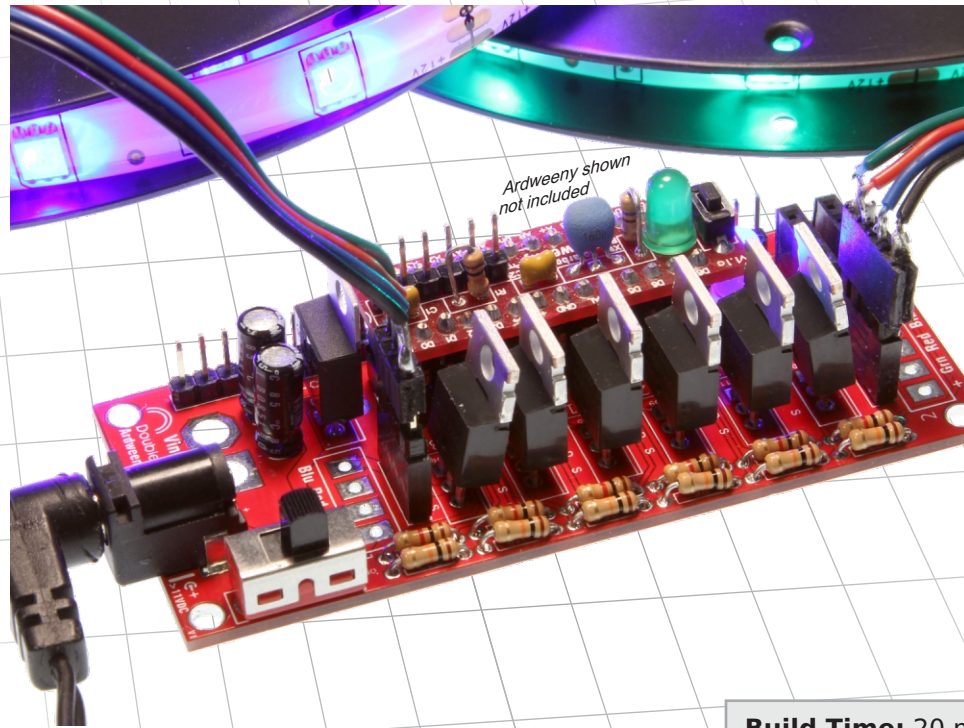# Double Rainbow

RGB LED Strip Controller Shield for the Ardweeny Arduino™ Compatible

"It's so Bright and Beautiful!"

Ardweeny shown not included

Build Time: 20 minutes
Skill Level: Intermediate (2/5)

RGB color strips are nifty, but a bit difficult to drive and control unless you have the right tools. And by tools, we mean an Arduino-compatible, like the Ardweeny, and *this kit: The Double-Rainbow!*

- Ardweeny-compatible (not included)
- Common-Anode RGB strip compatible
- Drives 2 strips independently
- 11A peak current per strip (5A nom.)
- G/V/S servo-style breakouts for remaining I/O
- BLINKM™-compatible I^{2}C header port
- Remote kill-switch header

SOLARBOTICS Ltd®

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1-866-276-2687
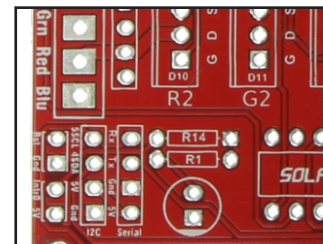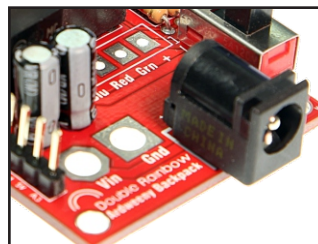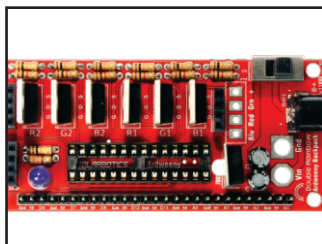
Introduction

ONCE upon a time, there was a little event called the "Calgary Stampede Grandstand Show", and the fine costume designers at the show walked into Solarbotics and said "We need RGB strip lights, and they must blink, and be small, and run multiple strips - can you help us?"

So the geeks at Solarbotics went into a huddle, discussed options, ate cookies, and came back and said "Why yes, we think we have a solution for you". And amongst the cookie crumbs and whiteboard diagrams, the "Double Rainbow" RGB LED strip light controller was created!

The costume designers were quite impressed, and took their Ardweeny & Double-Rainbow bundles and attached them to their costumes, and made their Grandstand stage show a huge success! The end (well, until we added a bit of polish, and developed this kit for you).

Here's the point list of features:
  - ➤ Drives two RGB strips, up to 11A peak per strip
  - ➤ Ardweeny backpack (Ardweeny Arduino-compatible not included)
  - ➤ Common-Anode RGB strip compatible (Vcc, plus RGB lines)
  - ➤ IRFZ44E 11A-rated FETs (one for each of the Ardweeny's 6 PWM lines)
  - ➤ Accommodates 0.1" pin headers (included) *and* 0.127" screw-terminal header (optional)
  - ➤ 5A-rated power switch (use bypass wiring to utilize full 11A capacity)
  - ➤ GVS-style (Gnd/Vcc/Signal) breakout headers for remaining I/O
  - ➤ Interrupt header for remote switch for light program pausing/disabling
  - ➤ BLINKM-compatible I2C header
  - ➤ Open-Source Hardware Compliant - see the schematics & design documents for yourself!

Our RGB striplights are rated to draw 3.25A per meter at 12VDC (producting FULL white), so you can <u>easily</u> drive 3 meters (10') per side. We have used our default RGB-cycler program to run 10M (two spools) on one channel over 15 hours. We measured an average current draw of 1.3A at 12VDC, with the RGB FET temperatures measured at 72°C, 51°C, and 41°C respectively, with a maximum PCB temperature of 34°C (in a room 22°C ambient). So don't snuggle up to the FETs, and you'll be fine!
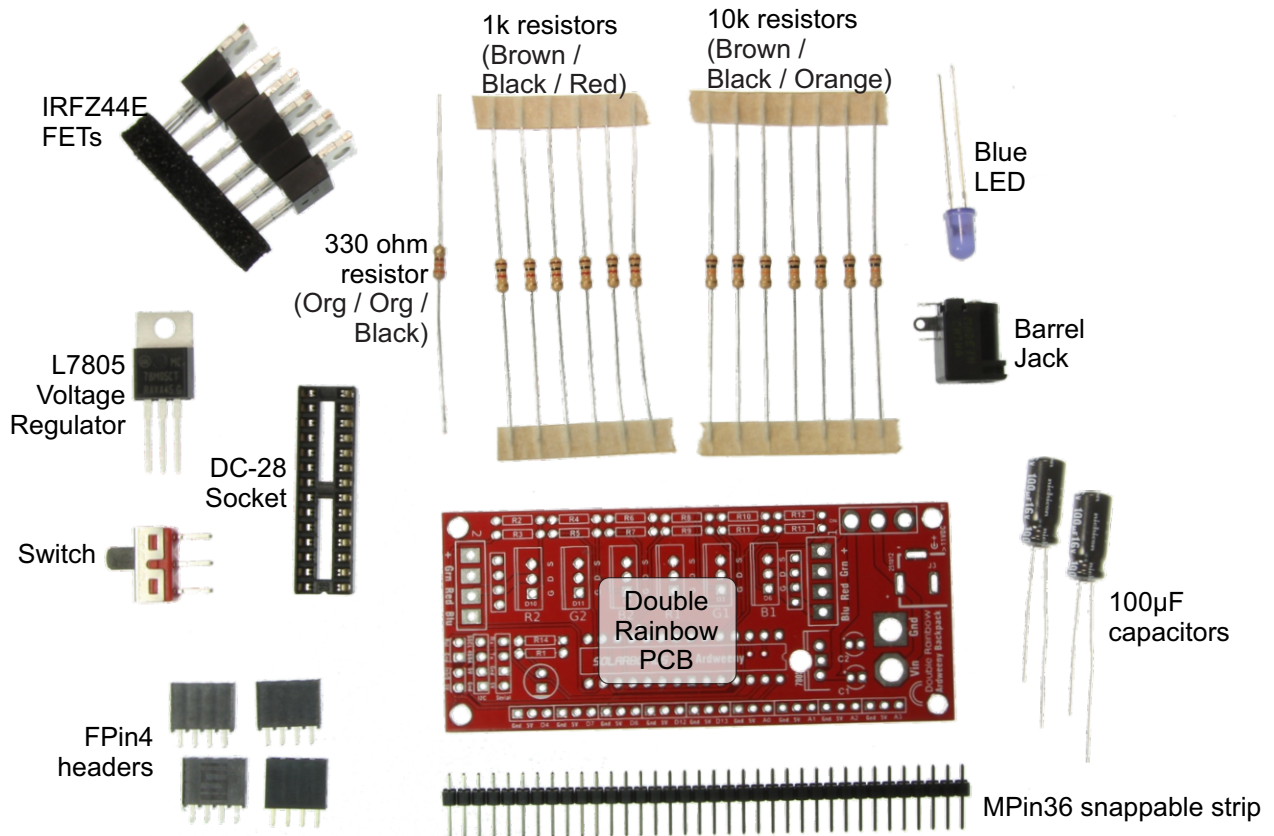
Parts List

- ❑ 1 x Double Rainbow printed circuit board (PCB)
- ❑ 6 x IRFZ44E FETs
- ❑ 1 x 330 ohm LED resistor
- ❑ 6 x 1k resistors (brown / black / red)
- ❑ 7 x 10k pull-down resistors (brown / black / orange)
- ❑ 2 x 100µF 16V electrolytic capacitors
- ❑ 1 x Blue LED
- ❑ 1 x 78M05 5V voltage regulator
- ❑ 1 x DC-28 pin Ardweeny IC carrier
- ❑ 1 x SWT16 5A Slide Switch
- ❑ 4 x FPin4 4-position female pin header
- ❑ 1 x MPin36 Snappable 36-pin male interface header
- ❑ 1 x Barrel Jack
- ❑ **Optional**: 2 x 4-position 0.137" screw terminals

IRFZ44E FETs

1k resistors (Brown / Black / Red)

10k resistors (Brown / Black / Orange)

Blue LED

330 ohm resistor (Org / Org / Black)

L7805 Voltage Regulator

DC-28 Socket

Switch

Barrel Jack

Double Rainbow PCB

100µF capacitors

FPin4 headers

MPin36 snappable strip

We strongly suggest you count the parts in your kit to make sure you have all the parts listed (c'mon - there's barely a handful of parts, so count them!). If anything is missing, contact Solarbotics Ltd. for replacement parts information.

Tools & Materials Needed (The 4 'S's):
- Soldering iron   - Safety glasses
- Solder   - Side/flush cutters

Construction!

Step 1 - Resistors and IC Carriers: Resistors resist. Carriers carry. Makes sense.

• Install the 1k (brown / black / red) resistors to positions R3, R5, R7, R9, R11 & R13. These are input Ardweeny I/O protection resistors .

• Install the 10k (brown / black / orange) pull-down resistors to locations R2, R4, R6, R8, R10, R12, and R14. These make sure the FETs are off by default.

• Install the 330 ohm (org / org/ brown) resistor at R1, which powers the blue LED.

• Install the DC-28 carrier to the only place that'll fit it.

6 x 1k
(brn / blk / red)

7 x 10k
(brn / blk / org)

330 ohm
(brn / blk / org)

Chip Carrier
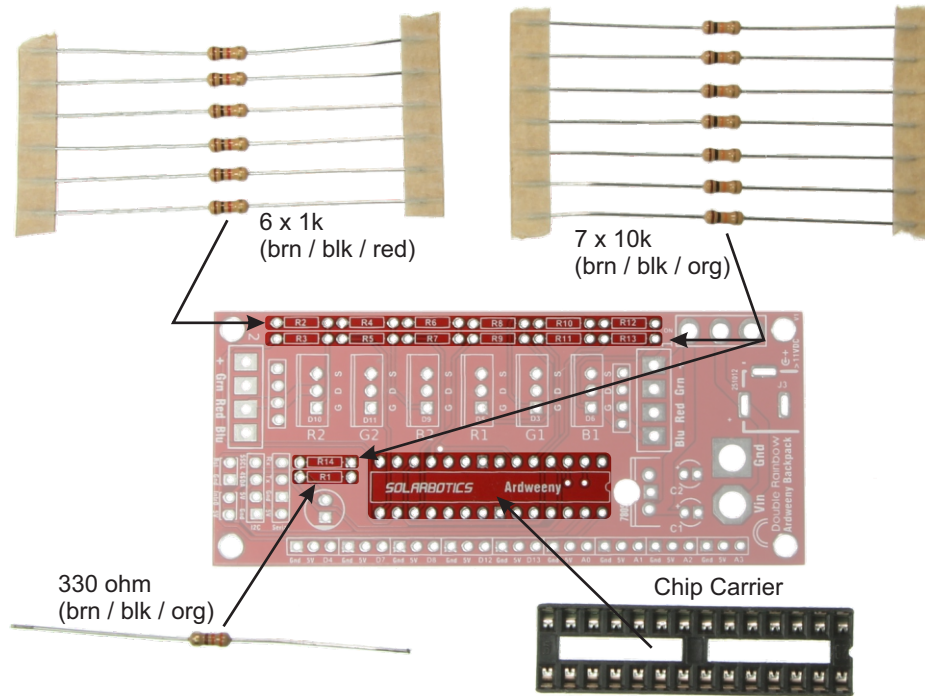
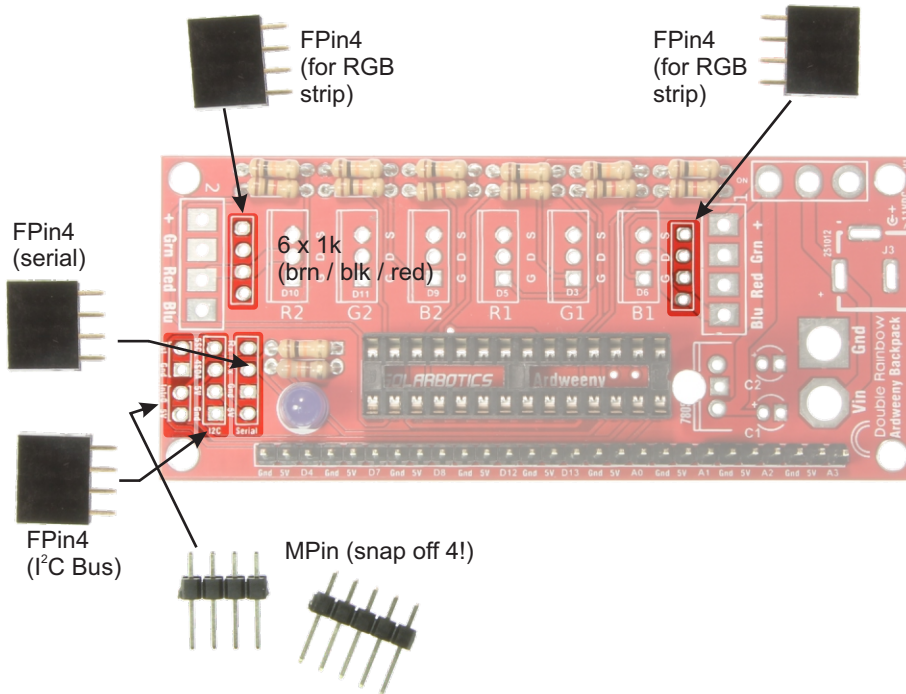**Step 2 - LED and Pins:** Blue LEDs are cool. Pins are cool too (but a bit nerdy).

• Install the blue LED at the *only* solo LED location. Match the outline!

• The pins come as a giant 36-pin strip. Snap of a set of 27, and install them to the extra I/O expansion pads. Or not - it's useful for getting extra work out of your Ardweeny!

Blue
LED

27-pin strip (snapped from set of 36)
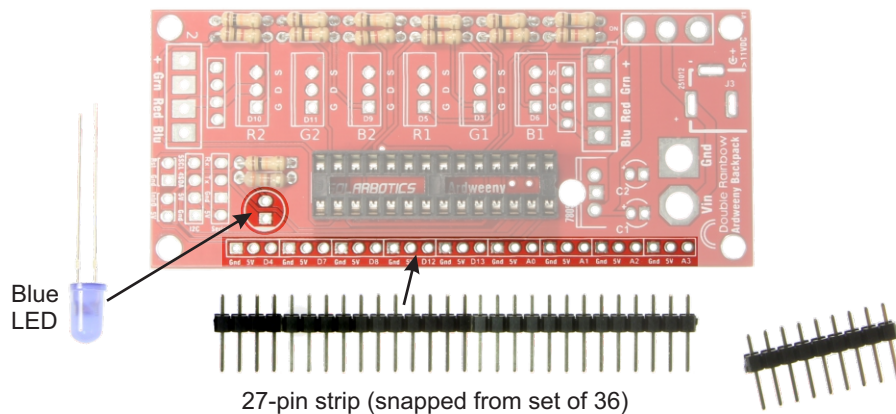
Construction!

Step 3 - Male & Female Pins: You're going to need places to plug stuff, so let's mount the FPin4 socket pins.

- The first two make it easy to plug in RGB strips, and the second two are optional, but handy for connecting to a serial or I^2C bus.
- Snap the remaining set of MPins into a set of 4 for the remote reset and interrupt pin connections, which are useful for mounting easy-to-reach controls for your project.

FPin4
(for RGB strip)

FPin4
(for RGB strip)

FPin4
(serial)

6 x 1k
(brn / blk / red)

FPin4
(I^2C Bus)

MPin (snap off 4!)

Step 5 - Voltage Regulator & Capacitors: Pappy always said that voltage weren't worth nuthin' if it weren't regulamated.

- Install the L78M05 in location '7805', matching the metal tab orientation.
- Install the 100μF capacitors in locations 'C1' & 'C2', strip side going into the square pad's hole.

2 x 100μF capacitors

78M05 voltage regulator
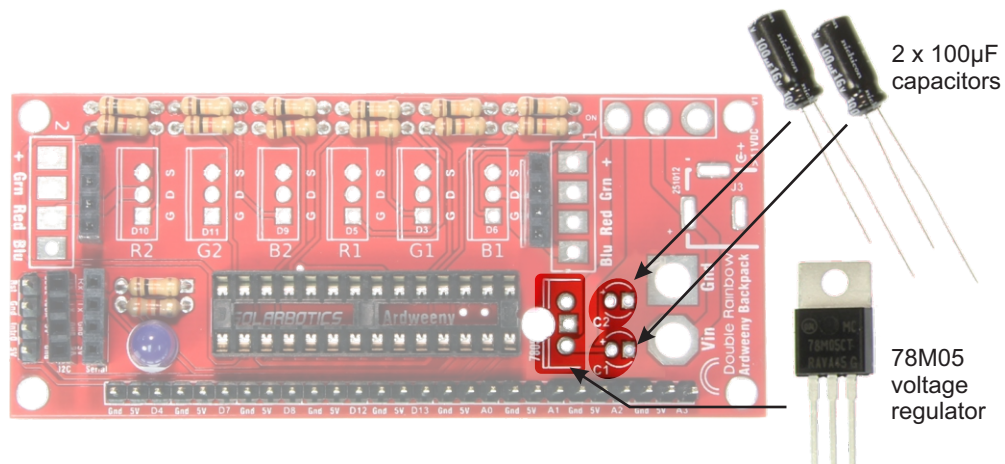
Construction!

Step 6 - FETs: Ah, the muscle behind the brains! But the muscle behind FETs is also sensitive to static discharge - make sure you are grounded before handling these parts. That's why they're stored in the anti-static foam - static protection!

- Install the 6 FETs in positions R1, G1, B1, R2, G2, & B2, with the tabs matching the orientation shown on the circuit board. These labels are also what channel they drive.


FETs. Yup, stick'em in these positions!
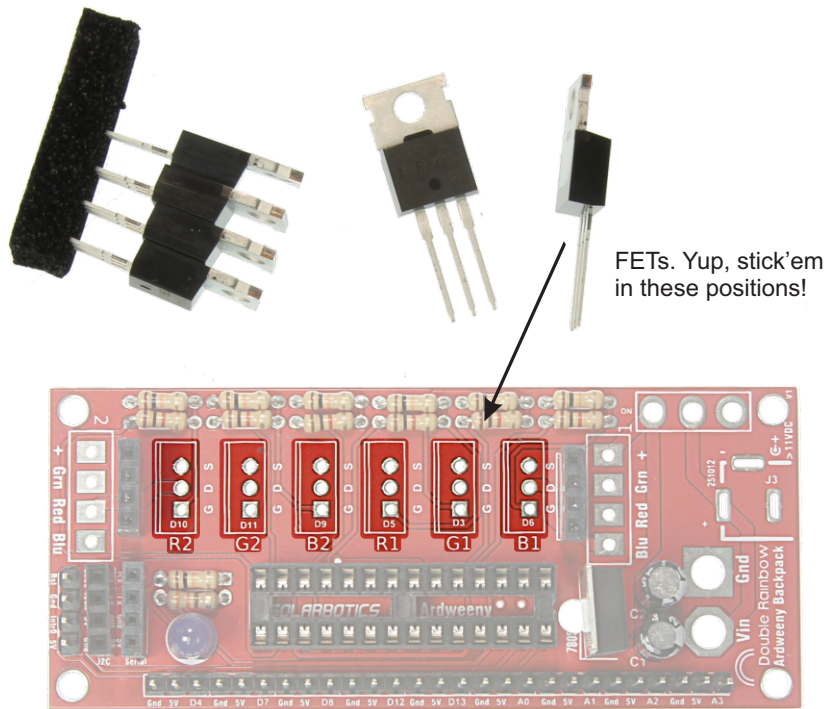
Step 7 - Power Switch & Jack: Here's the final assembly steps. The switch is rated for 5A, which should be beefy enough for most applications. If you expect to run current than that, consider running your power through the large 'Vin' and 'Gnd' pads, jump-wire the middle and left switch pads, and use plugs or relays to power your Double Rainbow.

5A Power Switch

2.1mm Barrel Jack
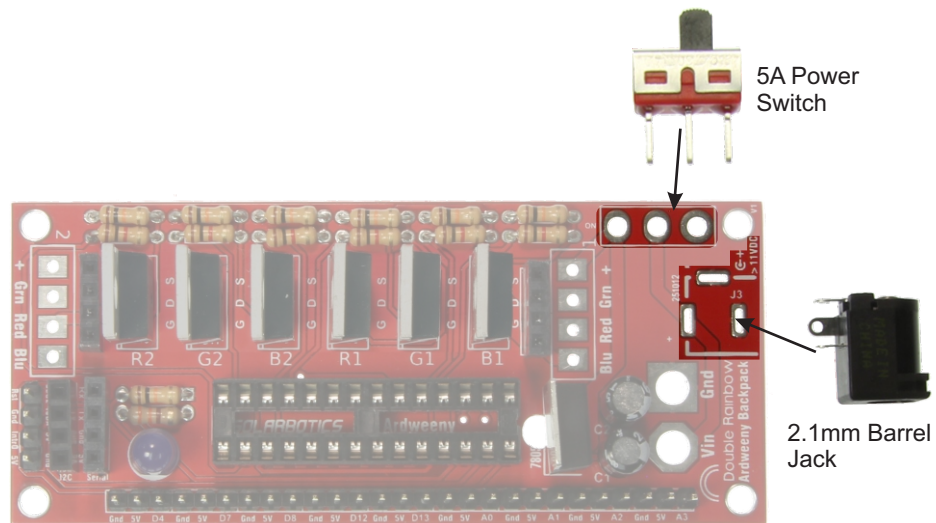
Construction!

Step 8 - Optional Screw-down Terminals: The standard FPin4 female headers will be fine for most of your regular RGB strip applications, but if you want a *really* sturdy and high-current solution, find some 0.137" spaced terminal headers, and mount them on the spaces provided on the PCB.
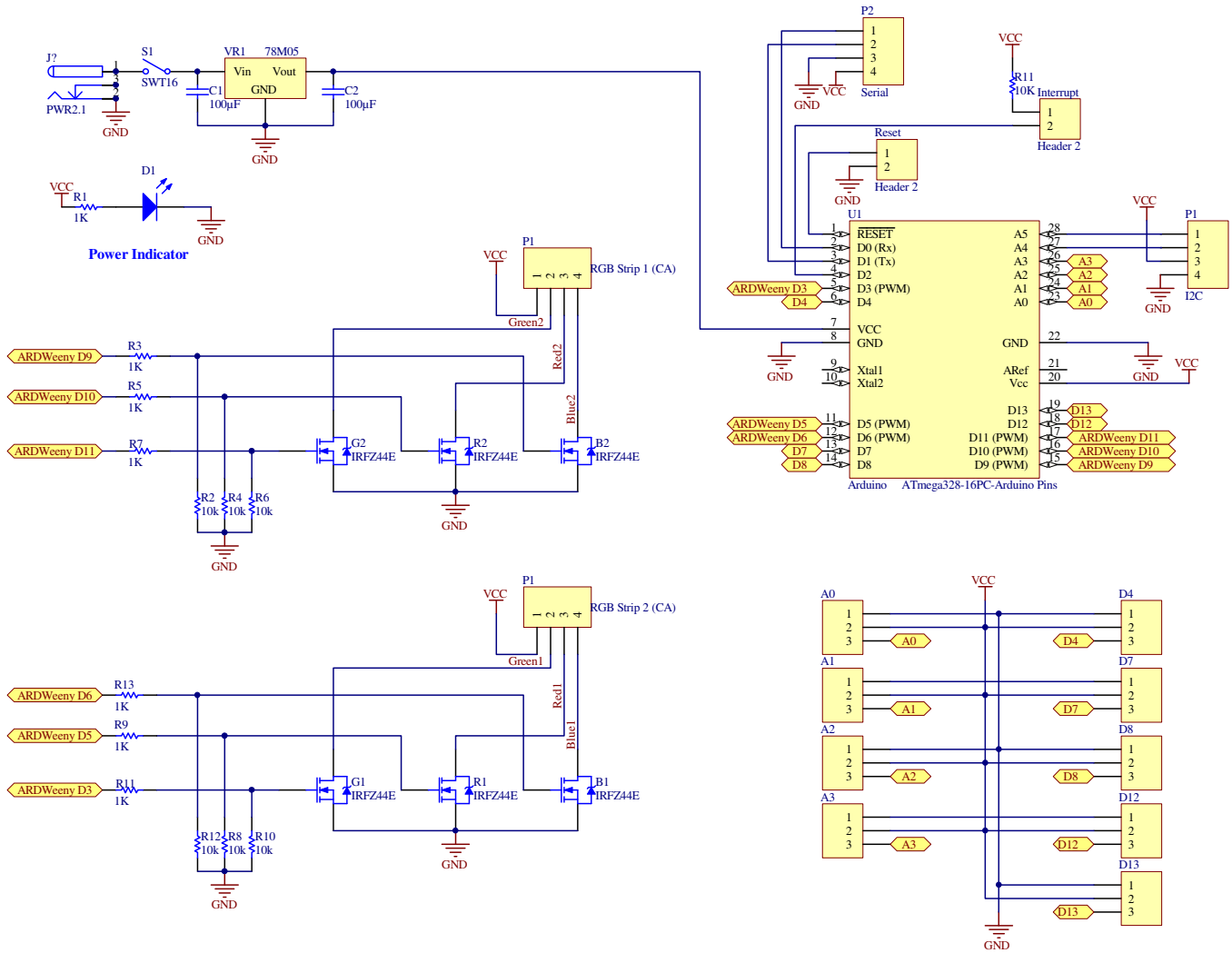

Optional
0.137 4-position
screw terminals
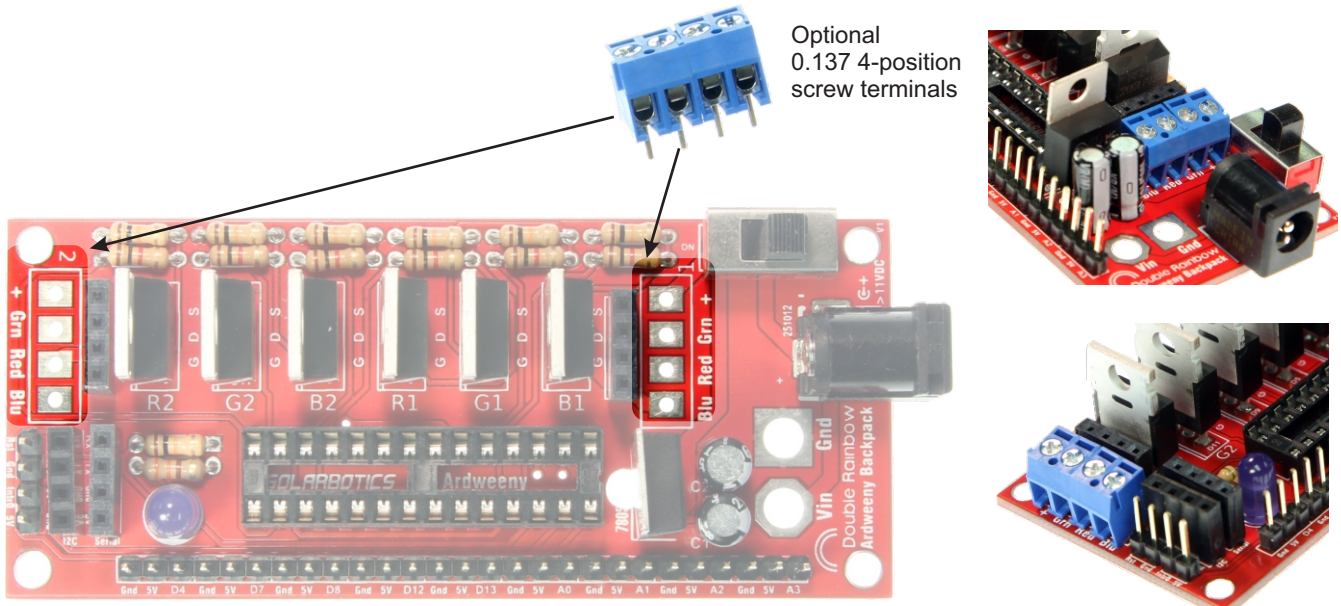
Step 9 - Da Ardweeny!: Plug the Ardweeny into the socket, with its LED closest to the PCB's blue LED. Add code. Add RGB Strips. Add power. BEHOLD THE DOUBLE RAINBOW!

Ok, we're not always such wise-butts around here. Check the resources link for some sample code you can load to your Ardweeny to run your RGB strips.

Schematic

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