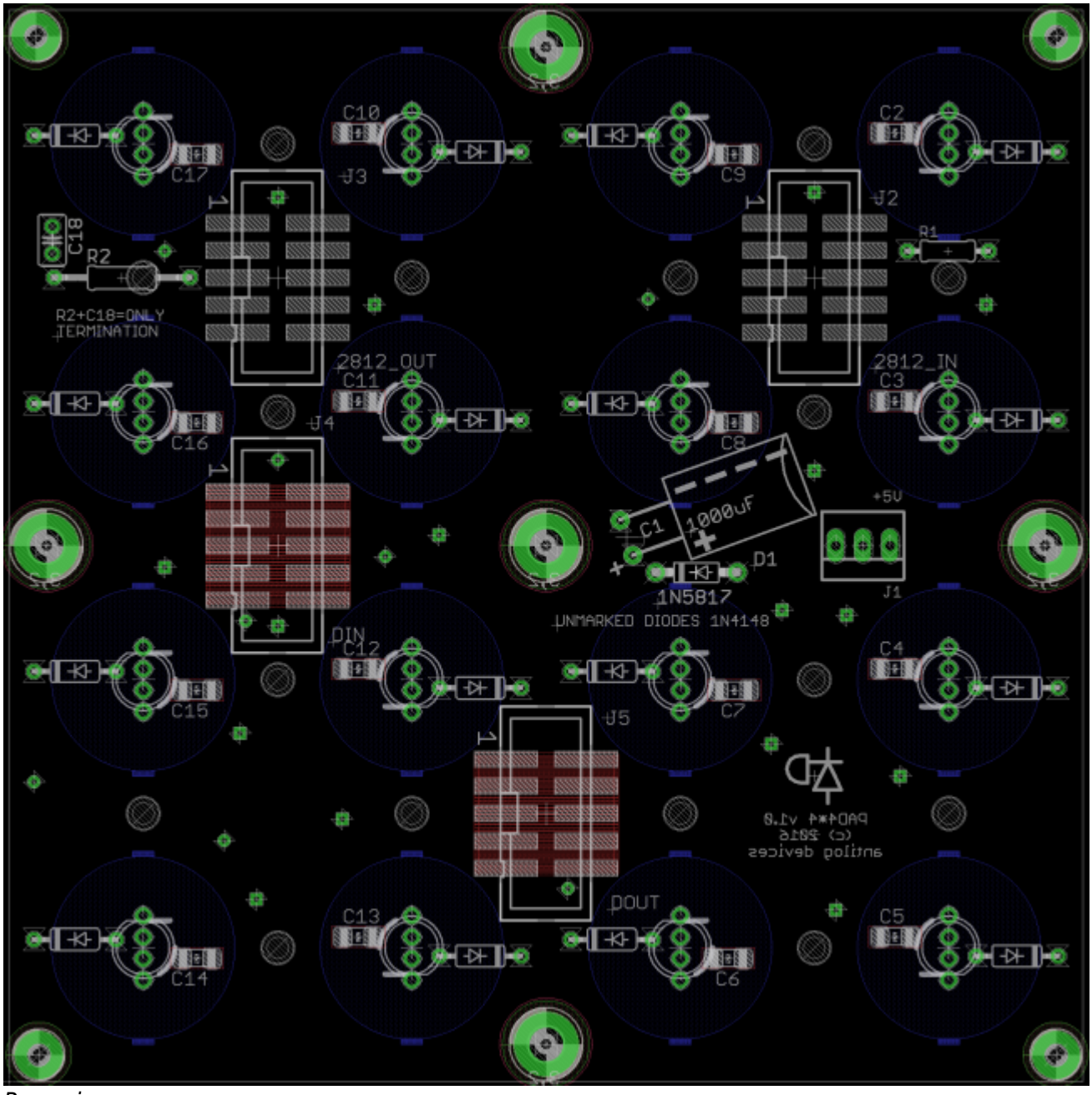
PAD_4*4 module

A neat way to couple WS2812B programmable LEDs (pLEDs) with a silicone button pad (e.g. Sparkfun)

Schematic

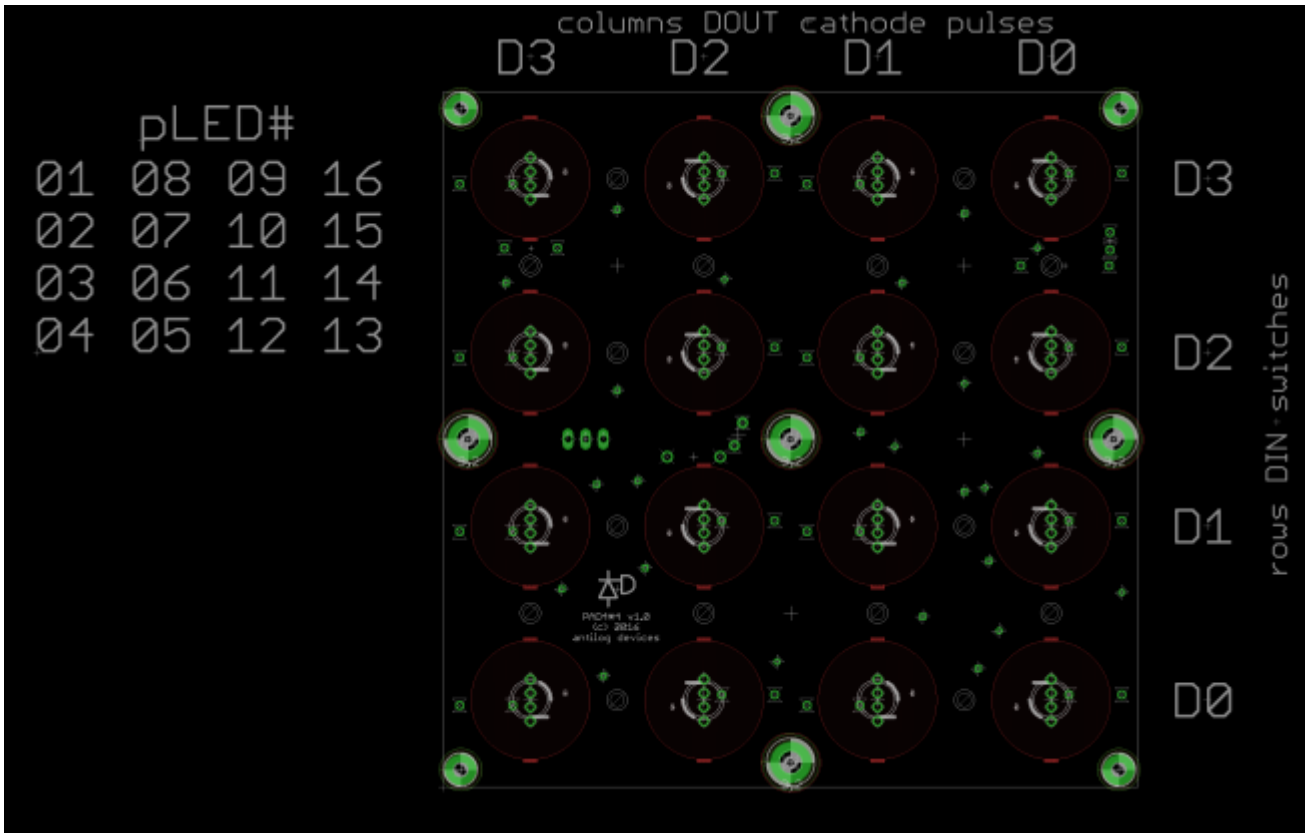


Rear view

Power input is +5V via a 3-pin 100mil connector (or Molex) and a Schottky diode. The value of electrolytic capacitor C1 is not critical.

The pLED chain enters via J2:pin 6 and resistor R1. The resistor should be replaced with a wire link for each additional module (i.e. only the first in the chain gets a resistor, the remainder stuffed with wire links). The serial chain then follows a snake pattern to J3, where additional pLED modules may be

connected. The RC (R2, C18) end termination shouldn't be necessary, but can be trialled should problems with signal reflection arise.



Front view

Switches are connected in a 4*4 matrix with the given mapping. D0 refers to pin 10 of the IDC header (i.e. top right) for both DIN and DOUT.

BOM v1.1

Type	Qty	Value	Package	Parts	Notes
resistors					
	1	220-470R	0204/7	R1	replace with wire link for each additional module
capacitors					
	16	100n	1206	C2-17	
	1	100-1000u	electrolytic 3,5-6	C1	
diodes					
	1	1N5187	DO41-7.6	D1	
	16	1N4148	DO41-7.6	remaining axial diodes	
	16	WS2812B	5mm	programmable LEDs	
headers					
	4		2*5 (shrouded) SMT	J2-5	can use DIL 100mil breakaway header strips
	1		1X03_SMALL	J1	can use Molex 22-23-2031
switches					

Type	Qty	Value	Package	Parts	Notes
resistors					
	1		Sparkfun 4×4 pad		
misc					
	1		acrylic bezel		

Versions

v1.1: current release. Some traces moved around, grounding error fixed. J1 power header changed to offset pads so an SMT pinheader may be soldered if desired.
v1.0: errata: J4 and J5 have no connection to ground. J1-3 do carry ground, so it isn't a problem if the DIN/DOUT modules share the same power rail.

Assembly

In order to keep the button pad flat, it's best to solder all components on the rear of the board i.e. opposite the pads. The contacts are exposed ENIG, so try not to damage the surface by scratching or splashing solder/flux on them.

Start by tinning one pad (preferably not the pad joined to the ground plane with thermals) of each 1206 capacitor, making a “tack” joint, aligning the part and cleaning up if needed.

The best way to fix the 1N4148 diodes is to place the parts then solder **from the same side** just the anode lead that intersects the pLED silkscreen. (The length of this lead isn't important as the LED will not be flush on the top face. Don't short out any pins though!) Turn the board around and clip the cathode lead as close to the board as possible. You can even pull the loose lead out slightly as long as you can still make a solid joint. On the **rear** of the board, solder the cathode with as little solder as possible. The aim is to leave no solder bump on the frontside. Try to give equal care to the other through hole components (R1, C1, D1, J1).

Check that the pinout of your pLEDs matches with the board i.e. serial in on the rounded side, serial out on the flattened side. Also test the height relative to the silicone button pad; it's not necessary to push the leads in the whole way (and you might damage your LED).

If using shrouded headers, ensure the notch points out on the same side as the pin 1 designator.

Interconnections

- J2 normally connects to Core J4B (I2C)
- J3 carries the WS2812B chain for additional modules
- J4 connects to a DIN header
- J5 connects to a DOUT header

License

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