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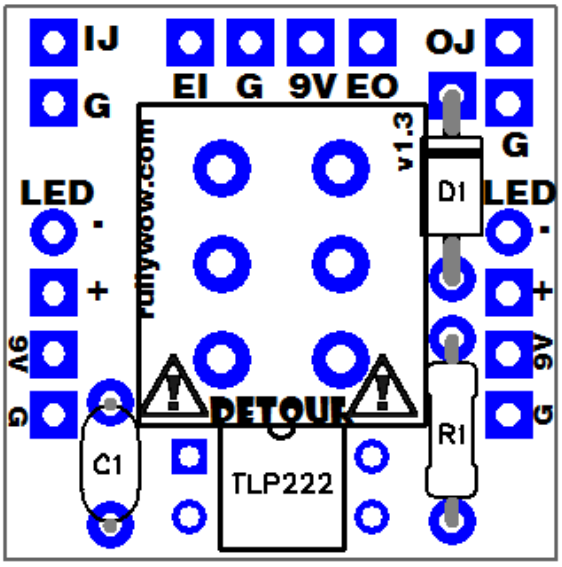
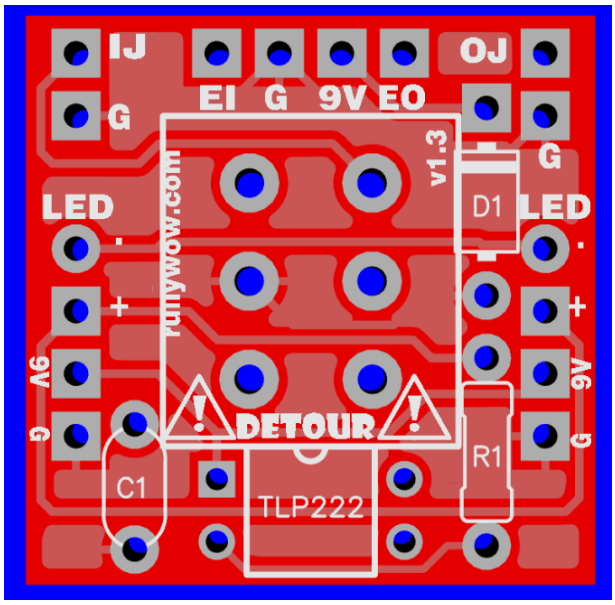
BUILD DOC

Detour v1.3
Optical Bypass PCB





Description:

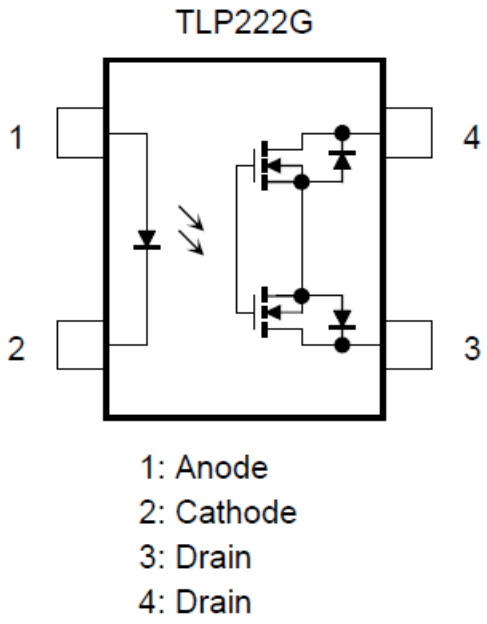
The Detour PCB is a take on the "optical" style of bypassing an effect. This style of bypass was implemented most famously by Voodoo Labs. This scheme was a genius solution especially back in the earlier days of pedal building where 3PDT switches were not as reliable/common/inexpensive as they are today. The optical bypass setup uses a DPDT switch, and an optocoupler to engage/bypass an effect and turn on a status LED. Optical bypasses also have the advantage of eliminating (or drastically reducing) audible "pops" compared to mechanical relays and regular 3PDT stomps as the on/off state is slowed by a capacitor in the circuit.

Detour Bypass Feature Set:

- Small footprint
- Low parts count
- Uses common, low cost, Toshiba TLP222G optocoupler
- Polarity protection
- LED able to be mounted on either left or right of PCB
- Pads line up to rullywow.com projects
- Extra power jacks for daisy chaining or powering other effects
- Mounts on an Alpha-Style latching DPDT (part# SF12011DF-0202-20R-L-011)

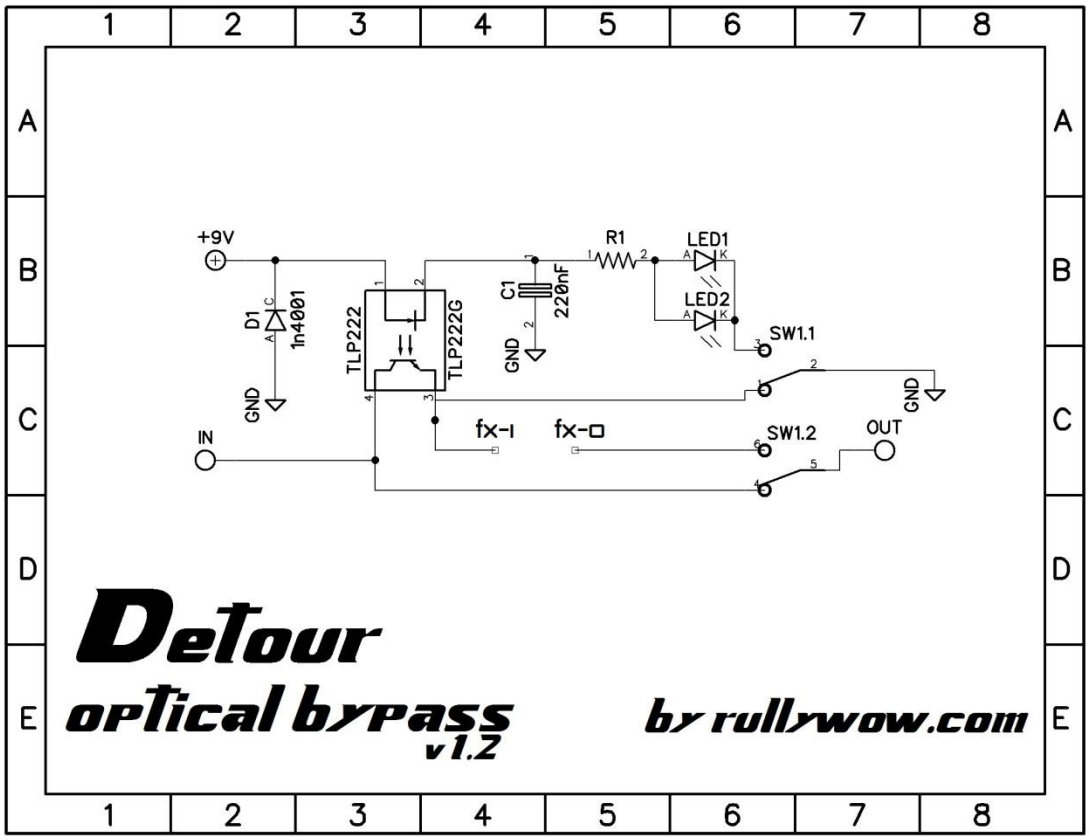
Optical Bypass Technology Explained:

The TLP222(G) optocoupler is essentially an LED and photo resistor (or FET) inside the DIP4 package. When voltage is applied to the internal LED on pins 1 and 2, the internal LED lights up and the resistance between pins 3 and 4 is then reduced to almost zero (50ohms MAX). The TLP222G was selected for the Detour project because of its small footprint and low on resistance. For a better idea, here is a picture of the internal workings of the TLP222G.



When the DPDT stomp of the Detour completes the circuit from 9v to ground, this illuminates the internal LED of the TLP222G and also the external pedal indicator LED in series. Additionally, the effect is routed to the output jack and the internal resistance between pins 3 and 4 is now almost zero – completing the circuit. The 220n capacitor helps "smooth" out the transition between bypass states and provides additional pop protection. See the schematic below for how this all fits together.

Schematic:



Tips:

- 9v is the nominal voltage however you can operate the TLP222G up to 25v. You should increase R1 as to not exceed 50mA through the TLP222 and your selected LED. Too much current through the TLP222G will burn out its internal LED (don't' do this!)
- R1 should be somewhere between 2k2 or 4k7. Increasing over 4k7 may cause the LED in the TLP222G to not light and resistance between 3 and 4 to increase over minimum. If you use a higher value (to get your external LED less bright) check the resistance between pins 3 and 4 to ensure it is low.
- Pay attention to where pin 1 is on the TLP222G. It is marked with a tiny dot and should always be mounted where the square pad is (upper left).
- LED can be mounted on either left or right side of the PCB. Recommended to only use one or the other LED mounts (not both) unless you are going to calculate a lower R1 resistor value.

- There are two sets of 9v and GND pads on the PCB. Normal way to use this is to use one set of pads to connect to your DC jack. You can use the spare set for other uses. This is a cool feature if you are building a multi-effect with multiple Detour PCBs for each switch as you can connect the power easily.
- The TLP222(G) was selected for its performance characteristics. While you can substitute a TLP222(A), it is recommended to try and obtain the TLP222(G) for lowest resistance and best results.
- The top middle four pads are ''EI, G, 9V, EO''. These correspond to ''Effect In, Ground, 9V, Effect Out'' and match almost all PCBs at rullywow.com so you can use ribbon cable if desired and keep your wiring really neat. Of course, you can wire these to any other PCB project without an issue.
- The 1n4001 diode may be left off the PCB if desired (as most effects already have reverse polarity protection) however an extra diode isn't a bad feature and diodes are cheap!

Bill of Materials

Cap		
Position	**Value**	**Type**
C1	220n	film
Diode		
D1	1n4001	DO41

Resistor	
Position	**Value**
R1	2k2-4k7

OptoCoupler
TLP222G

Footswitch:

Is an Alpha DPDT (or compatible) with part number **SF12011DF-0202-20R-L-011** or equivalent. They have silky smooth action and look like this:

Terms of Use:

- PCBs from www.rullywow.com are intended for DIY use and are not allowed for commercial resale. It is OK to build (and sell) a few pedals for your friends, bandmates, yourself (that is what the DIY guitar pedal community is all about!). It is not OK to start your own boutique "pedal company" using this PCB or any other Rullywow Industries PCB without permission from rullywow.com.