VFE_SPS_Dragon

FX Type: **DYNAMIC OVERDRIVE**
Build Level: Intermediate
Based On: VFE® Dragon™

Last Updated: April 26, 2024 11:19 AM

Overview

From the VFE website:

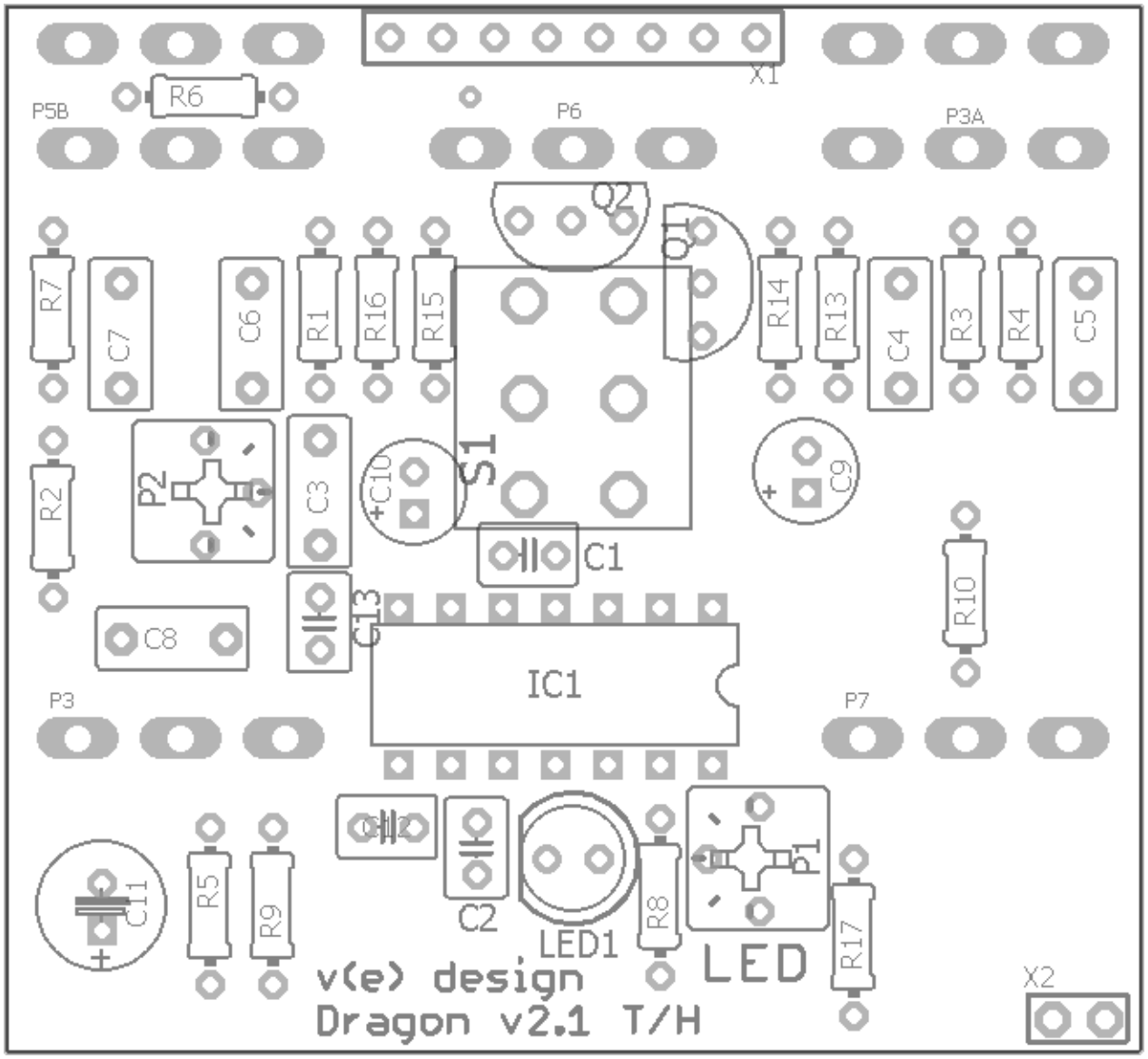
"Tubescreamer. Rat. Klon. OCD. Tim. KoT. What do all these beloved drive circuits have in common? They all cut bass before distortion, and cut treble after distortion. This basic recipe is the backbone of many of the dirt pedals you use. Enter the Dragon, a dynamic overdrive designed to give you ultimate power over the pre-gain bass cut (HPF) and post-gain treble cut (LPF). Precisely tighten or fatten up your low end, smooth out the top end or add sparkle. Go from a transparent tone to a focused mid boost to push through a dense band mix, or just use it to light your favorite drive on fire."

The SPS Dragon includes the TrueSoft 3.4 switching PCB *with* the voltage inverter. You will need additional parts and information included in the TrueSoft doc to complete all VFE_SPS projects.

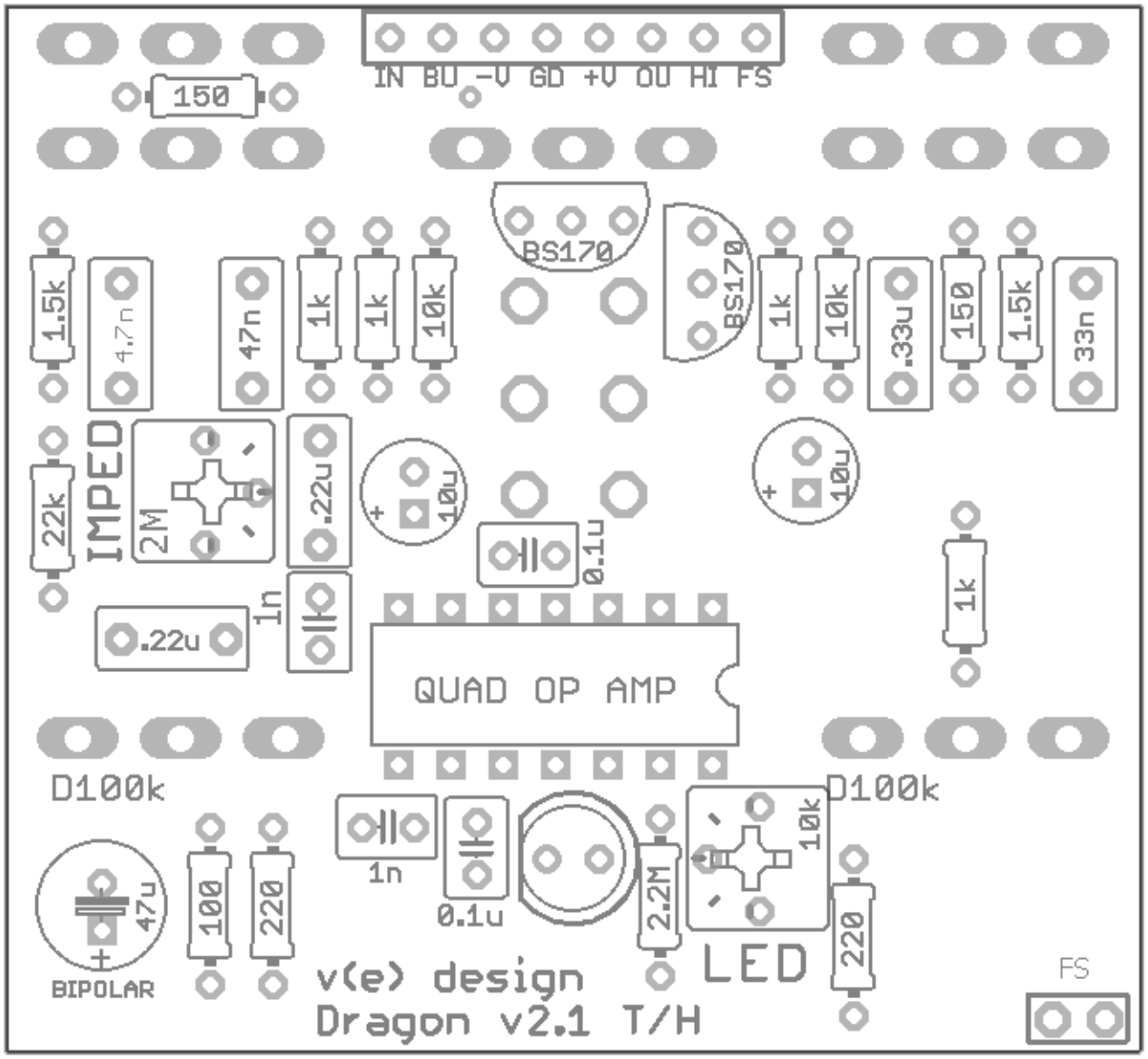
Controls

- **LEVEL, DRIVE:** Self-explanatory.
- **HPF:** High pass filter control to cut low frequencies (pre-gain).
- **LPF:** Low pass filter control to cut high frequencies (post-gain).
- **COMP:** Dynamic control over the two mosfet clippers that create the overdrive one. The center position uses the least amount of clipping. The CCW and CW positions blend in different amounts of clipping via the series mosfets.
- **IMPED:** This trimmer sets the input impedance to the effect. Set high for single coils (CW), med for high output humbuckers (middle) and low for active pups (CCW).
- **SLOPE:** This switch determines whether the HPF and LPF act at -6dB or -12dB per octave.
- **LED:** Controls the bypass LED brightness.

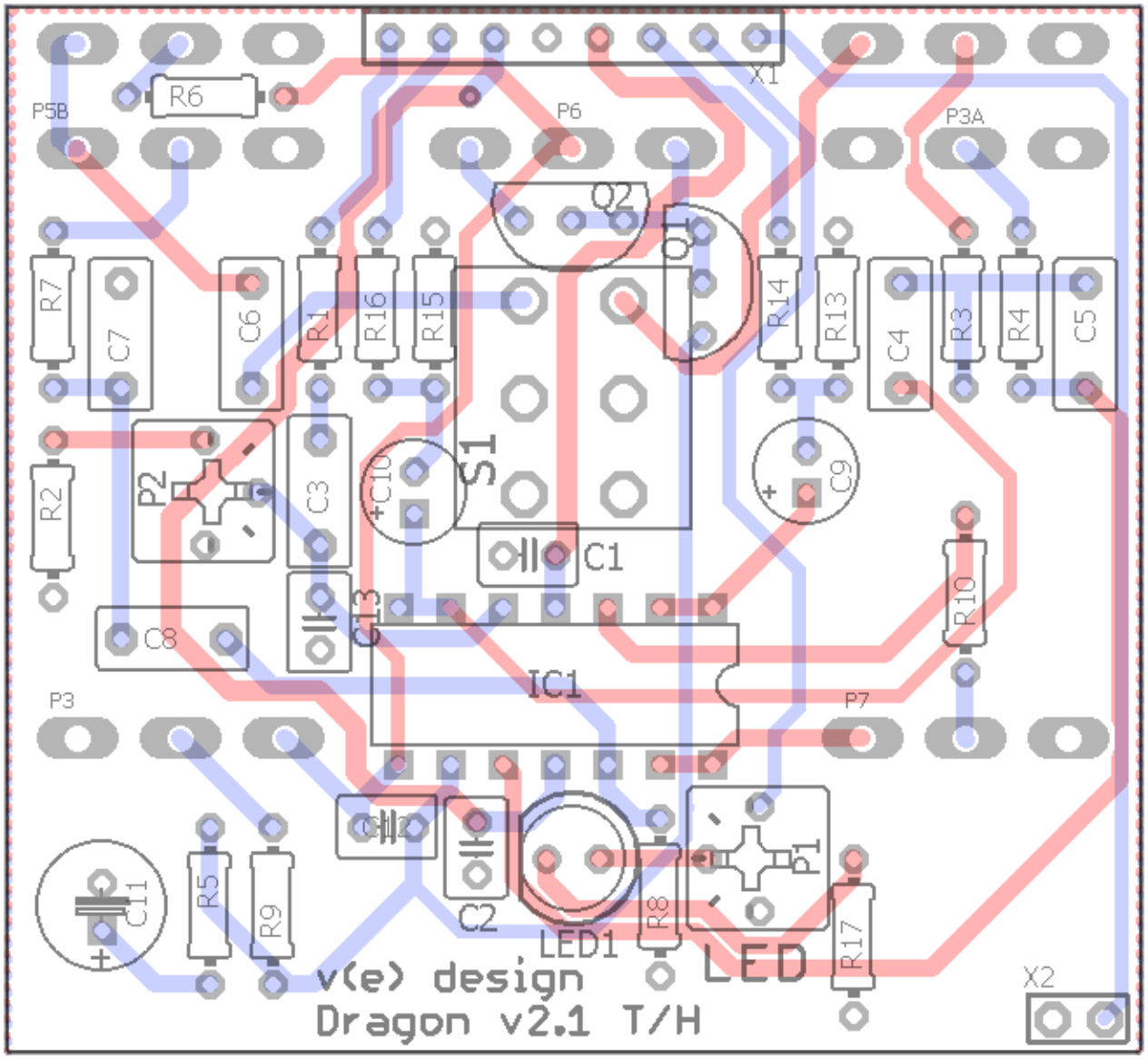
Parts Layout



Component Values



Trace Layout



B.O.M.

Resistors		Caps		Diodes	
R1	1k	C1	0.1u	LED1	5mm
R2	22k	C2	0.1u	**Transistors**	
R3	150R	C3	.22u	Q1	BS170
R4	1.5k	C4	.33u	Q2	BS170
R5	100R	C5	33n	**IC**	
R6	150R	C6	47n	IC1	Quad amp
R7	1.5k	C7	4.7n	**Switches**	
R8	2.2M	C8	.22u	S1	On/On/On
R9	220R	C9	10u	Footswitch	Momentary
R10	1k	C10	10u	**Trimmers**	
R13	10k	C11	47u	P1	10k
R14	1k	C12	1n	P2	2M
R15	10k	C13	1n	**Pots**	
R16	1k			P3AB	C10k/100k
R17	220R			P3	D100k
				P5AB	C10k/100k
				P6	W200k
				P7	D100k

Shopping List

Value	QTY	Type	Rating	Spacing
100R	1	Carbon / Metal Film	1/4W	
150R	2	Carbon / Metal Film	1/4W	
220R	2	Carbon / Metal Film	1/4W	
1k	4	Carbon / Metal Film	1/4W	
1.5k	2	Carbon / Metal Film	1/4W	
10k	2	Carbon / Metal Film	1/4W	
22k	1	Carbon / Metal Film	1/4W	
2.2M	1	Carbon / Metal Film	1/4W	
0.1u	2	MLCC	25v min.	2.5mm
1n	2	MLCC	25v min.	2.5mm
4.7n	1	Film	25v min.	
33n	1	Film	25v min.	
47n	1	Film	25v min.	
.22u	2	Film	25v min.	
.33u	1	Film	25v min.	
10u	2	Bi-Polar Electrolytic	25v min.	
47u	1	Bi-Polar Electrolytic	25v min.	
LED	1	any	5mm	
BS170	2			
QUAD	1	see notes		
DPDT	1	On/On/On, pin mount		
SPST		Footswitch, momentary		
10k	1	Bourns 3362p		
2M	1	Bourns 3362p		
C10k/100k	2	see notes	16mm	
D100k	2	see notes	16mm	
W200k	1	see notes	16mm	

Build Notes

The Dragon uses some specialized pots which are available at Stomboxparts:

C100k/C10k: https://stompboxparts.com/pots/16mm-dual-gang-pot-short-pcb-leg/
D100k: https://stompboxparts.com/pots/16mm-potentiometer-short-pcb-leg/
W200k: https://stompboxparts.com/potentiometers/16mm-potentiometer-short-pcb-leg-center-detent/

- The surface mount version of the Dragon uses a OPA4134 IC, which is only available as an SMD package. You can sub in a TL074 or any other quad amplifier that can handle 18v or more.

- As mentioned in the intro, the Slope switch selects between -6dB or -12dB on the filters. However, Peter has indicated that the switch type is On/On/On. This means there is a middle position which does not seem to be well documented. From tracing the PCB, the middle position appears to be a mix: -6dB on the LPF and -12dB on the HPF (when using a "type 2" On/On/On switch). TBH - I'm not sure how useful this setting is. There's no harm in having it, but if you want to simplify the operation, just use an On/On DPDT which should provide plenty enough variation. **Remember that you must use a pin-mount type in either case.**

"Type 2" On/On/On:

https://lovemyswitches.com/taiway-dpdt-on-on-on-switch-pcb-mount-short-shaft/
https://stompboxparts.com/switches/dpdt-toggle-switch-on-on-on-pcb-pin-short-bat/

Non-Polar/Bi-Polar Electrolytic caps:

https://stompboxparts.com/capacitors/aluminum-electrolytic-capacitor-non-polarized-10-pack/

MLCC caps:

0.1u 2.5mm MLCC: https://www.mouser.com/ProductDetail/594-K104K15X7RF53L2
1n 2.5mm MLCC: https://www.mouser.com/ProductDetail/594-K102J15C0GF5TL2

- Note: If you are using guitars with single coils or humbuckers, try the Dragon with the IMPED trimmer set very low. It can make the circuit more interactive with guitar volume changes.

Circuit Voltages

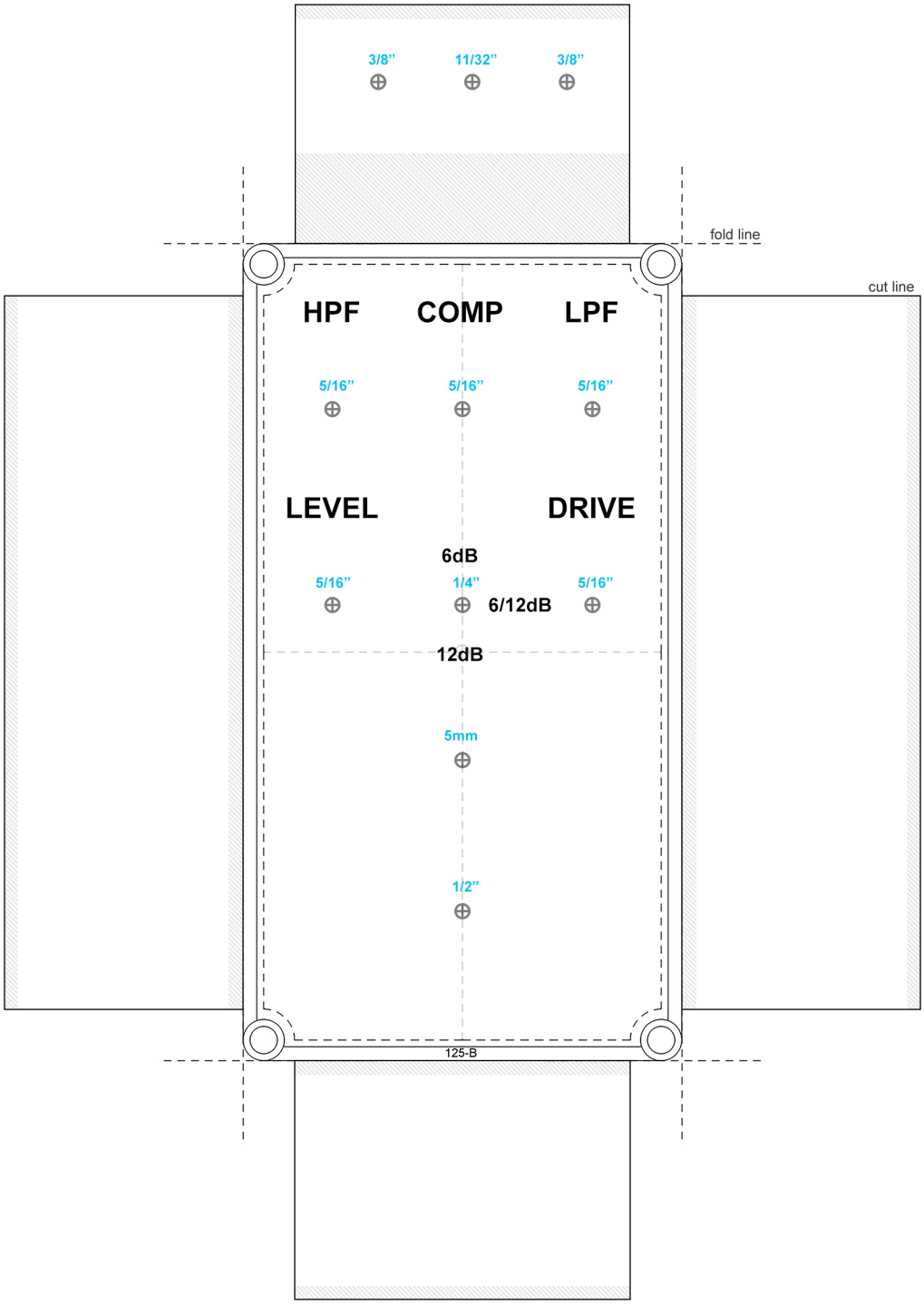
IC1	TL074
1	42mV
2	43mV
3	46mV
4	9.19
5	0.00
6	0.00
7	0.00
8	0.00
9	0.00
10	0.00
11	-8.99
12	-406mV
13	-457mV
14	-457mV

Q1	BS170
D	0
G	0
S	0

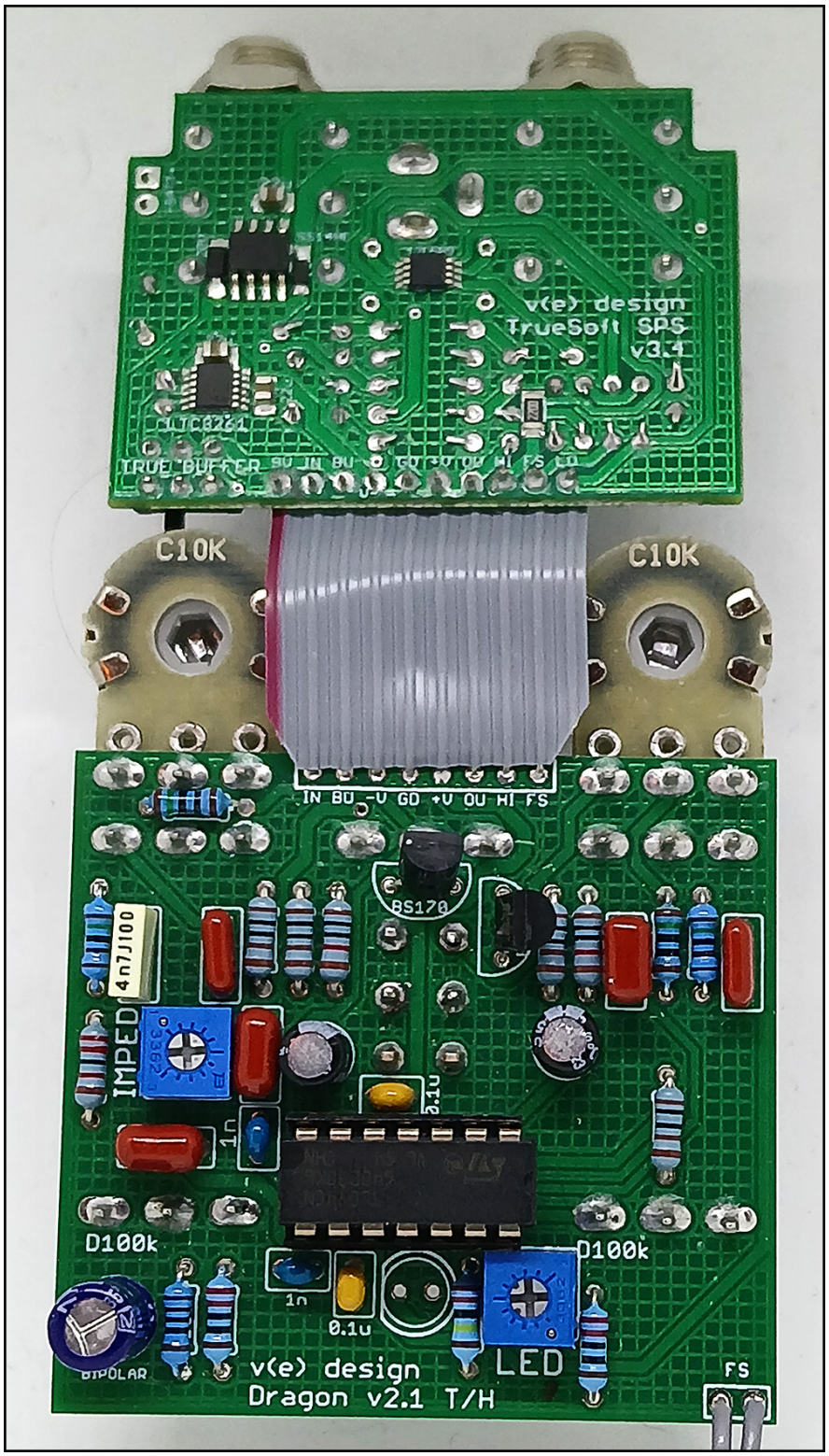
Q2	BS170
D	0
G	0
S	0

9.44vDC One Spot supply
Current Draw: ~50mA
Knobs @ 50%, switch down
Split-rail design

125B Drill Template



Build Pic


v(e) design
TrueSoft SPS
v3.4
TRUE_BUFFER
C10K
C10K
IN BU -V GD +V OU HI FS
BS170
4n7J100
IMPED
0.1u
1n
D100k
D100k
1n
0.1u
BIPOLAR
v(e) design
Dragon v2.1 T/H
LED
FS

Schematic