ZiRCONiA V1.1

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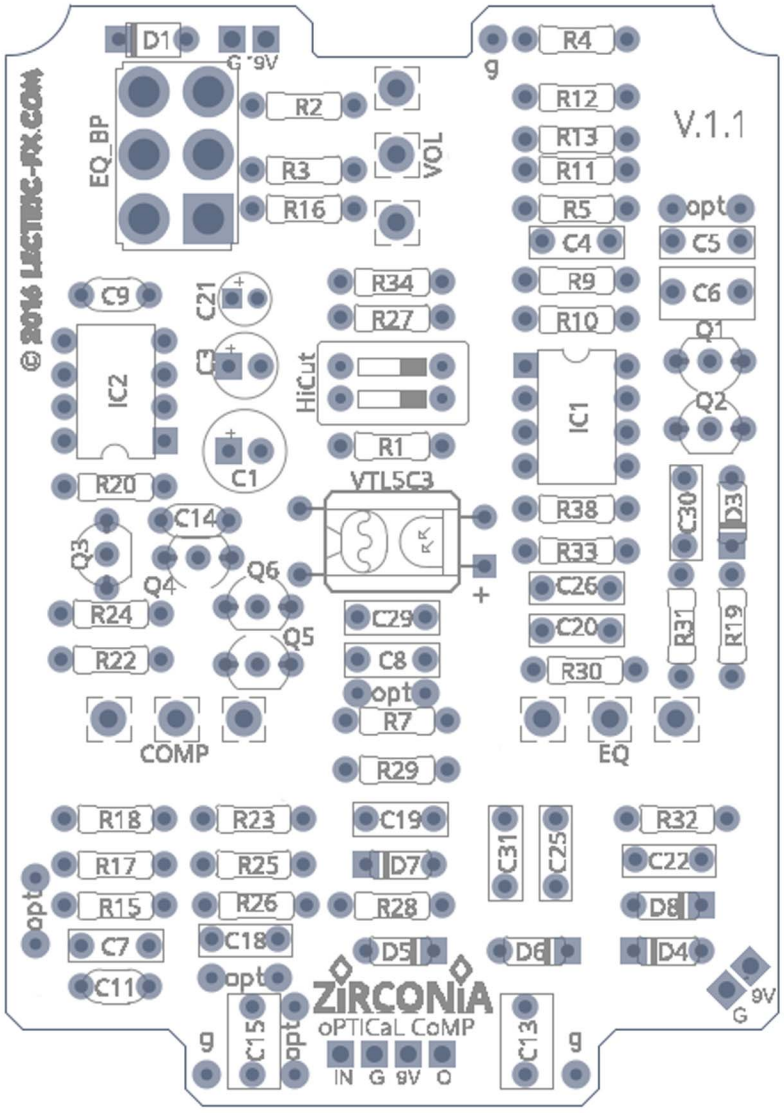
oPTiCaL CoMP



Changes for V1.1: Pots and switch have been moved. and a few other parts have been shifted, flipped or swapped (Q4, R34, R27)

The ZiRCONiA is an optical compressor using a VTL5C3 vactrol (or similar) that includes a tilt style EQ, external EQ-bypass toggle, and internal Hi Cut switch.

The controls are:
Volume- Sets the output level.
EQ- This is a "tilt" style EQ that cuts bass as the treble is increased (CW) and conversely cuts treble as bass is increased (CCW).
COMP- Increases the amount of compression and sustain.

The Hi Cut dipswitch uses the bottom dip only. The top switch is floating. Also, please note the "+" symbol near the vactrol's silkscreen, which indicates the position of the positive leg.

ZiRCONiA Bill of Materials

Part #'s/Values

R1	100R	C1	100u	Q1	2N3904
R2	10k	C3	47u	Q2	2N3904
R3	10k	C4	5n6	Q3	2N3904
R4	100R	C5	5n6	Q4	2N3904
R5	15k	C6	330n	Q5	2N3904
R7	22k	C7	100n	Q6	2N3904
R9	15k	C8	100n	D1	1N4001
R10	47k5	C9	100p	D3	1N4148
R11	47k5	C11	100p	D4	1N4148
R12	47k5	C13	1u	D5	1N4148
R13	47k5	C14	100p	D6	1N4148
R15	1M	C15	330n	D7	1N4148
R16	475R	C18	100n	D8	1N4148
R17	475k	C19	10n	IC1	LM358
R18	475k	C20	10n	IC2	OP275
R19	3k3	C21	2u2	VACTROL	VTL5C3
R20	6k4	C22	100n	HiCut	DIP2
R22	100R	C25	3n3	SW2	DPDT
R23	475k	C26	15n	VOL	100KA
R24	22k	C29	3n3	COMP	100KB
R25	100k	C30	100n	EQ	50KB
R26	1k	C31	100n		
R27	3k3				
R28	475r				
R29	220k				
R30	475k				
R31	100k				
R32	220k				
R33	100k				
R34	475k				
R38	10k				

Cap/Resistor Totals

3	100R	3	100p
2	475R	4	820p *
1	1k	2	3n3
2	3k3	2	5n6
1	6k4	2	10n
4	10k	1	15n
3	15k	6	100n
2	22k	2	330n
5	47k5	1	1u
2	100k	1	2u2
3	220k	1	47u
4	475k	1	100u
1	1M		

* Optional parallel caps for C6, C7, C8, C15, and C18. See explanation below.

There are 4 spaces on the pcb labeled "opt" These are where you would install the 4x 820p caps if you so wish. They aren't crucial to the sound, so we omitted them from the schematic.

Some of the resistor values are a bit odd. feel free to sub the closest value without fear. Example- a 470R can be used in place of 475R.

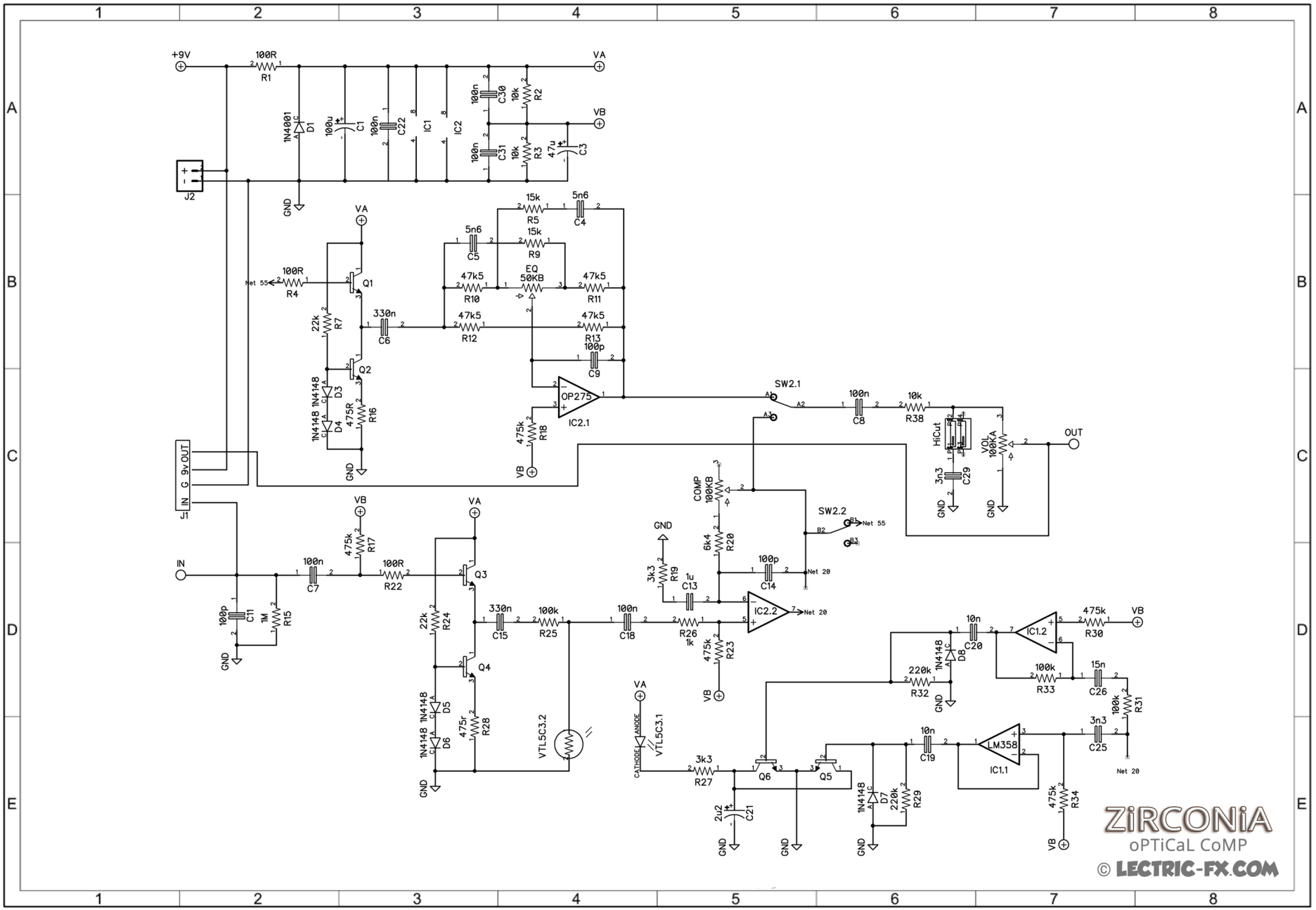
The VTL5C3 is the recommended vactrol, but I used the MI1210CL**F**-R (smallbear item SKU: 2510M) with great results. It is possible an NSL-32, or even a home rolled vactrol could work, but I have not tested this.

Bill of Materials (BASS version)

R1	100R	C1	100u	Q1	MPSA18
R2	10k5	C3	47u	Q2	2N5088
R3	10k5	C4	4n7 *	Q3	2N3904
R4	100R	C5	4n7 *	Q4	2N3904
R5	15k	C6	4U7	Q5	2N3904
R7	22k	C7	100n	Q6	2N3904
R9	15k	C8	4U7	Vactrol	VTL5C3
R10	47k5	C9	100p	IC1	LM358
R11	47k5	C11	100p	IC2	OP275
R12	47k5	C13	2u2	SW2	DPDT
R13	47k5	C14	100p	HiCut	DIP2
R15	1M	C15	4u7	VOL	100KA
R16	475R	C18	100n	COMP	100KB
R17	475k	C19	10n	EQ	50KB
R18	470k	C20	10n		
R19	4k7	C21	2u2		
R20	6k8	C22	100n		
R22	100R	C25	3n3		
R23	470k	C26	15n		
R24	22k	C29	3n3		
R25	100k	C30	100n		
R26	1k	C31	100n		
R27	3k3	D1	1N4001		
R28	470r	D3	1N4148		
R29	220k	D4	1N4148		
R30	470k	D5	1N4148		
R31	100k	D6	1N4148		
R32	220k	D7	1N4148		
R33	150k	D8	1N4148		
R34	470k				
R38	10k				

The bass version is run at 18v, presumably for more headroom. A madbeanpedals Road Rage or 3PRR would be ideal to use for this, running the 18v out of the RR to the 9v in on the ZiRCONiA pcb. Whether you use a Road Rage or a 3PRR, we recommend using LT1054 just to be safe, since the VTL5C3 draws 20mA on its own.

***** These 2 caps decide the center frequency of the EQ control. They can be socketed for experimentation. The 4n7 values listed will give a center freq of 1060Hz, while a pair of 18n or 22n caps will be closer to 250Hz.


+9V
100R
R1
VA
VB
1N4001
D1
100u
C1
100n
C22
IC1
IC2
100n
C30
10k
R2
100n
C31
10k
R3
47u
C3
J2
GND
15k
R5
5n6
C4
5n6
C5
15k
R9
EQ
50KB
47k5
R10
47k5
R11
100R
R4
Net 55
Q1
330n
C6
47k5
R12
47k5
R13
22k
R7
100p
C9
Q2
1N4148
D3
1N4148
D4
475R
R16
OP275
IC2.1
475k
R18
SW2.1
100n
C8
10k
R38
HiCut
VOL
100KA
OUT
3n3
C29
J1
IN
G
9v
OUT
COMP
100KB
SW2.2
Net 55
6k4
R20
100p
C14
Net 20
3k3
R9
1u
C13
IC2.2
Net 20
475k
R17
100R
R22
100n
C7
IN
100p
C11
1M
R15
Q3
Q4
22k
R24
330n
C15
100k
R25
100n
C18
R26
1k
475k
R23
1N4148
D5
1N4148
D6
475r
R28
VTL5C3.2
VTL5C3.1
CATHODE
ANODE
3k3
R27
Q6
Q5
2u2
C21
10n
C20
1N4148
D8
220k
R32
IC1.2
475k
R30
100k
R33
15n
C26
100k
R31
10n
C19
LM358
IC1.1
3n3
C25
Net 20
1N4148
D7
220k
R29
475k
R34
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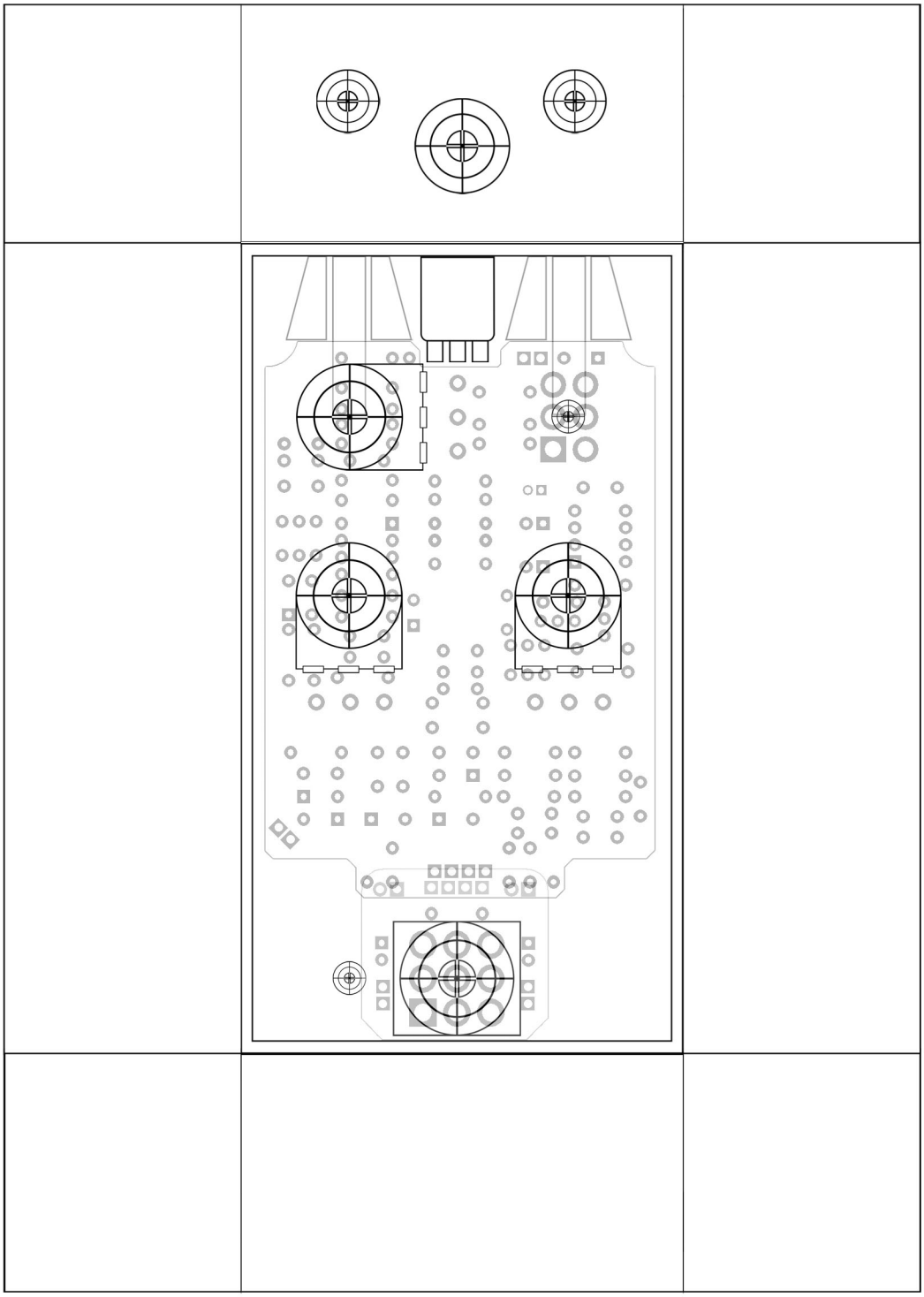
Drill Guide Suggestion (Top Mount)

125b- Untested!



When using top mount jacks with the 3pdt pcb you may need to install D1, C13 and C15 on the backside.