

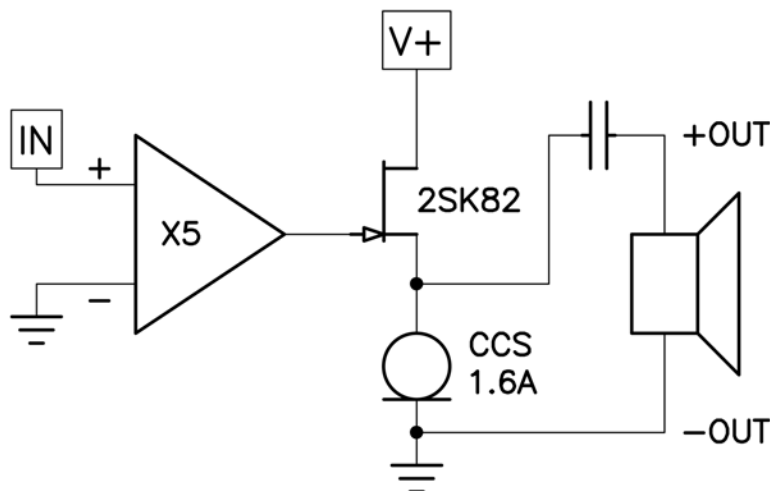
DIY SONY VFET AMPLIFIER Part 2 - the N Channel Version

by Nelson Pass

Introduction

This article is the second half of the DIY Sony VFET amplifier project. You will want to treat this as an addendum to Part 1, and probably need to refer to that for some of the information you will want.

The amplifier of Part 2 is conceptually identical to the previous design, but is altered to use the N channel 2SK82 VFET instead of the P channel 2SJ28. You will find that the output stage topology is the same, but many of the polarities of parts and voltages have been reversed. The simplified schematic looks like this:

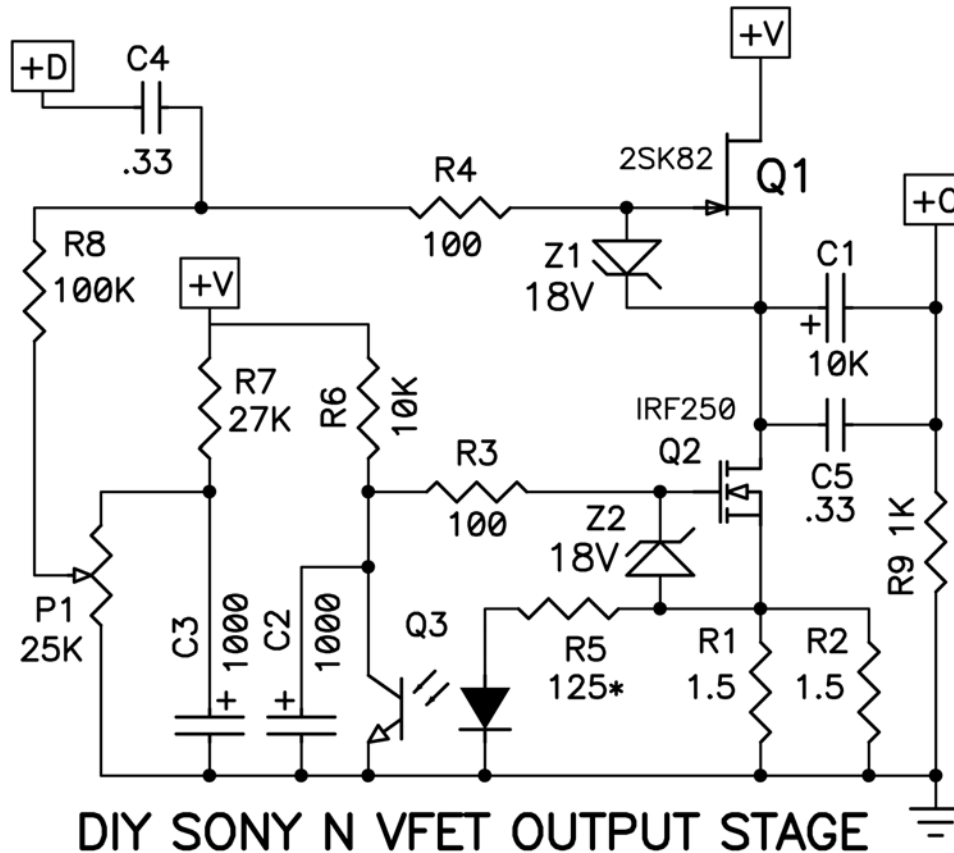


You will want to note that in addition to alterations of part locations, the signal phase has been changed. The X5 front end no longer inverts the signal and the phase of the loudspeaker connection is also now non-inverted. This is because the 2SK82 gives us the desired polarity of the 2nd harmonic distortion we want without needing the double inversion of the Part 1 2SJ28 VFET circuit.

Also altered is the power supply filter for the channels. It is understood that the desktop switching supply has some noise which would degrade the performance of the amplifier, more so with the N channel VFETs as followers since the Drain of the VFET is attached to the V+ supply, and the low Drain impedance of the VFET allows much more noise through than the Drain of your typical power Mosfet. To take care of this, more elaborate filtering is employed on Part 2. The low N channel Drain impedance also allows more turn-on/off thump, so I have added a relay to reduce that.

The good news is that the end performance of the N channel amplifier is virtually identical, so much so that I will omit the usual curves and specs.

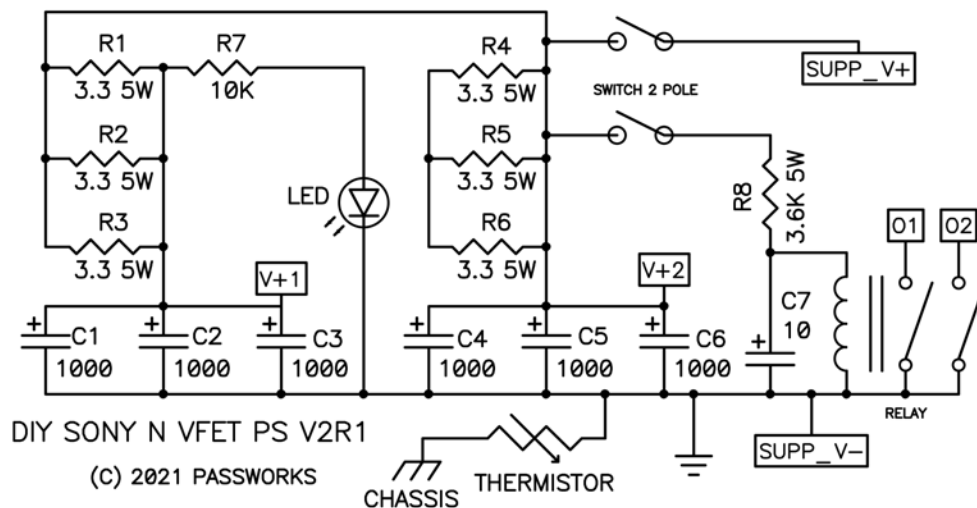
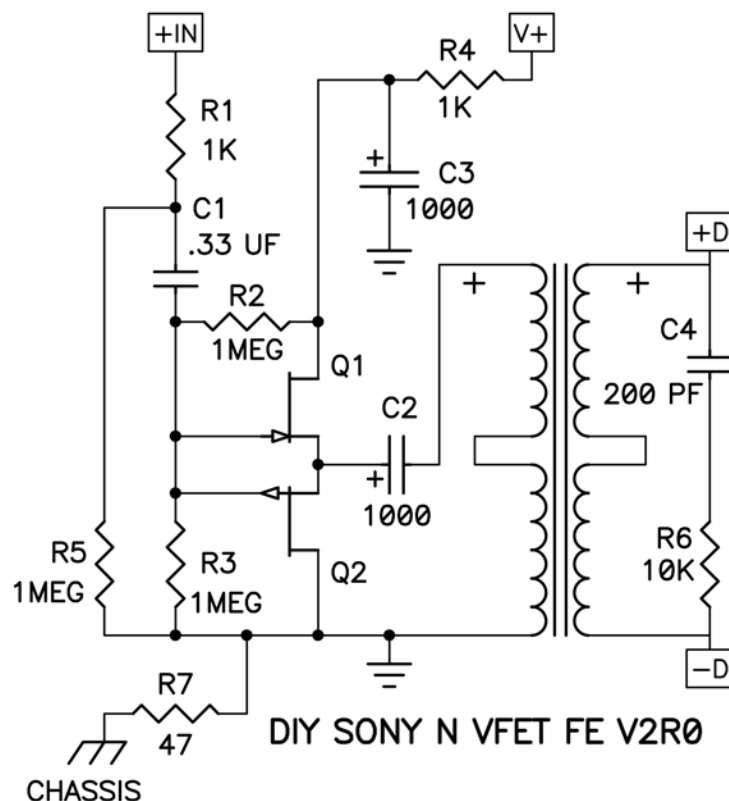
Here is the detailed output stage:



Some of the numbers have changed and it's upside down, but you will find much the same parts doing the same functions as in Part 1. Also as with the P channel version the kit will arrive with the output stage partially assembled and tested for shorts, leakage, and proper bias. Note the * next to the R5 value - in testing I found that R5 wanted some selection to get the bias figure just right, so 125 ohms is typical, and you might find a slightly different value on your output stage. Also, P1 wants to be adjusted to give +14 volts at the Drain (case) of the IRF250, and trimmed after it warms up.

The front end is identical to that of Part 1, only the name of the board has been changed to "N VFET FE". The alteration of phase from Part 1 is found in the output connections D+ and D-, and is handled by reversing the wiring between the front end and the output stage, so you will see that in the board wiring diagram.

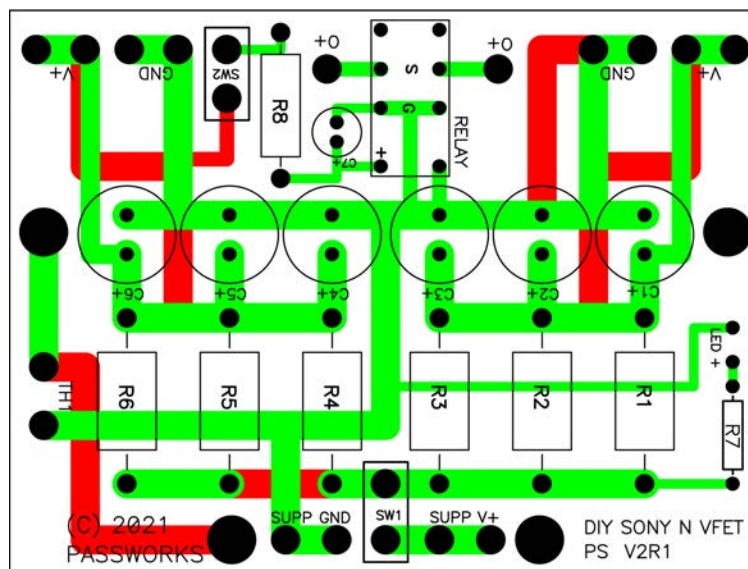
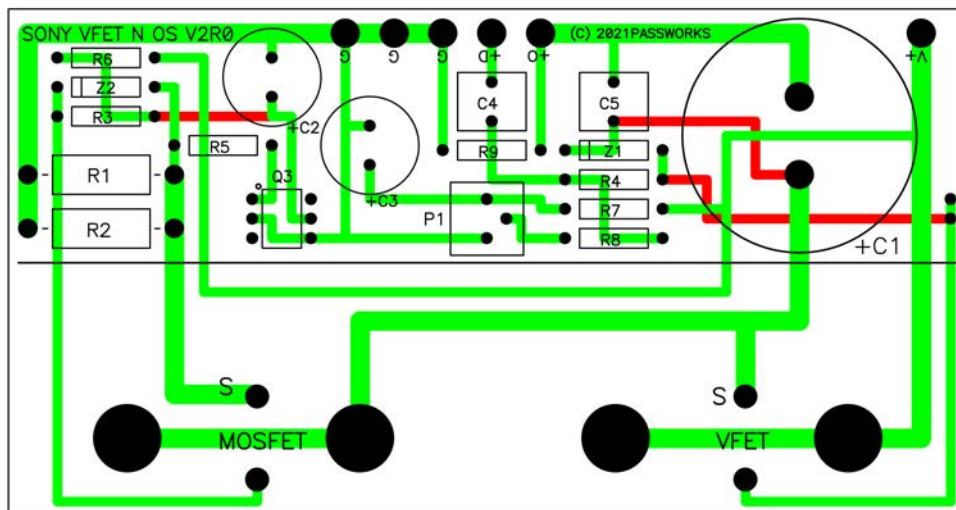
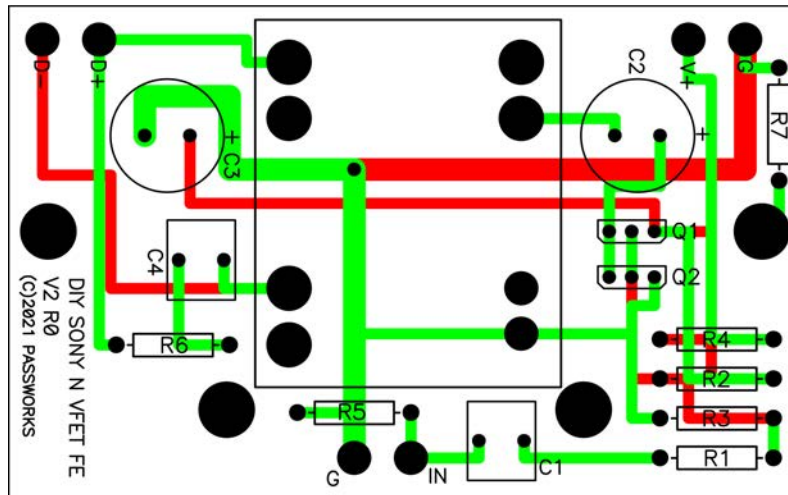
Here are more schematics:



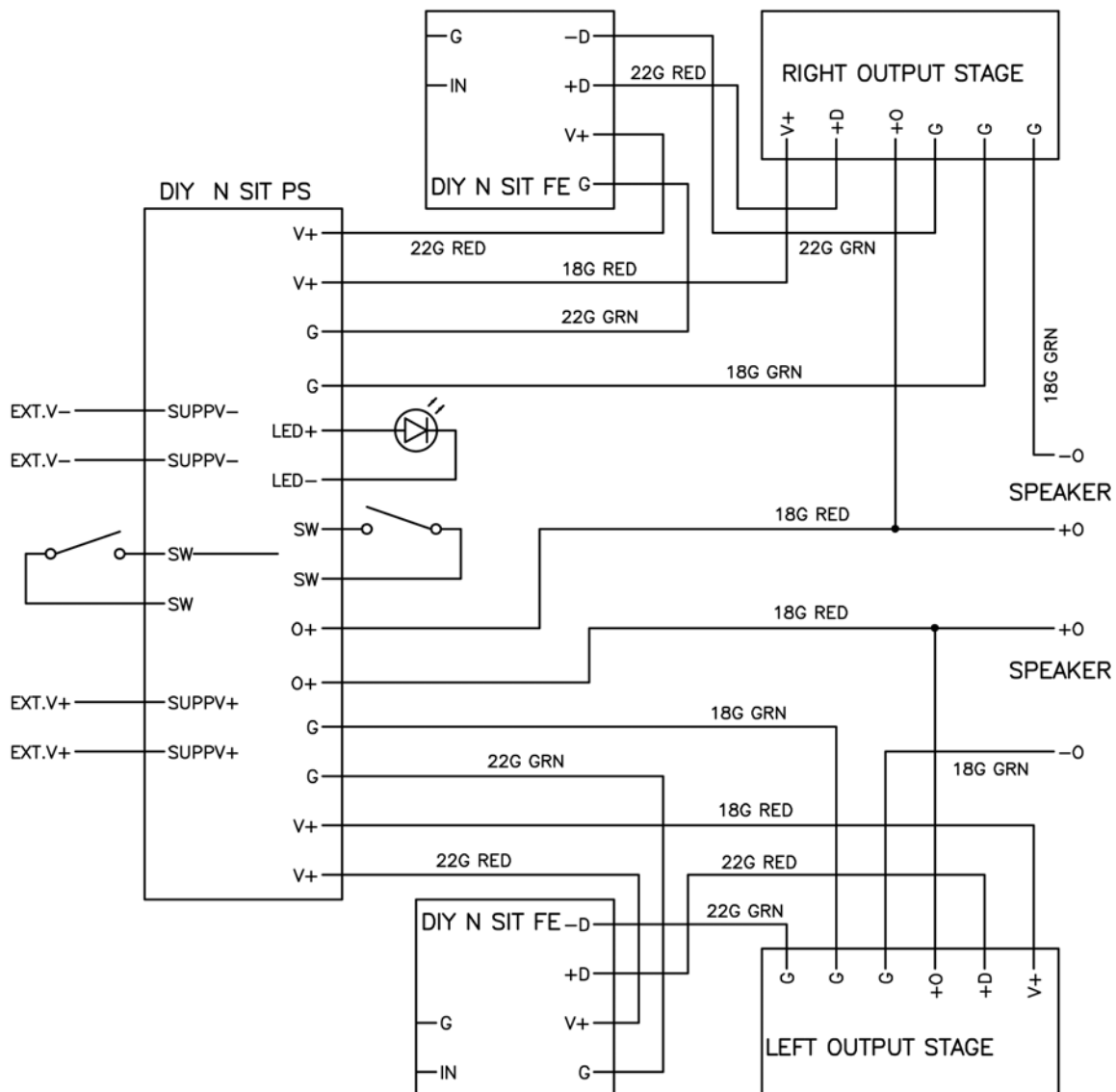
You will note the more elaborate filtering, made necessary by the VFET's exposure to rail noise and the larger thump of the circuit on turn-on/off.

It has a DPDT switch for on/off to make this work, and a relay which shorts the speaker output to ground. R8 at 3.6 Kohm was tested to be adequate to open these normally closed contacts after a short delay, but if it doesn't you will want to parallel another resistor with it to make the resistance value a bit smaller.

Following are the pc board images:



Here is the wiring diagram showing the wiring between components:



Conclusion

So here we are. With a little luck, this offering of 90 N channel Sony VFET amplifiers at www.diyAudio will be as successful as the P channel version.

It is planned that there will also be kits for those who already have the 2SK82 or 2SJ28, and a new (different) kit for those who have the 2SK60 or 2SJ18 VFETs.

Enjoy.

DIY SONY VFET AMPLIFIER - PART 2 - BILL OF MATERIALS

NOTE - * AFTER PART # INDICATES ALREADY MOUNTED ON OS PC BOARD

SUB	REF #	QTY	DESCRIPTION	VENDOR	PART #
OS	DIY VFET N OS V2 R0*	2	SONY N VFET OS V2R0		
OS	BRACKET*	2	CHANNEL BRACKET		
OS	MOSFET TO-3*	2	IRF250		
OS	VFET TO-3*	2	2SK82		
OS	Q3*	2	OPTO ISOLATOR - LITE ON	DIGIKEY	160-1304-5-ND
OS	Z1*, Z2*	4	ZENER DIODE 18V	DIGIKEY	1N5248BFSTR-ND
OS	R1*, R2*	4	RESISTOR 1.5 OHM 3W	DIGIKEY	A138414TB-ND
OS	R3*	2	RESISTOR 100 OHM .4W	DIGIKEY	PPC100YCT-ND
OS	R5*	2	RESISTORS 125 OHM - TYP.	DIGIKEY	PPC125YCT-ND
OS	R6*	2	RESISTOR 10K OHM .4W	DIGIKEY	PPC10.0KYCT-ND
OS	TO-3 INSULATOR*	4	THERMAL PAD		
OS	C1	2	CAPACITOR 10000 UF 50V	DIGIKEY	604-1050-ND
OS	C2, C3	4	CAPACITOR 1000 UF 50V	DIGIKEY	493-12786-3-ND
OS	C4, C5	4	CAPACITOR .33 UF PP	MOUSER	MKP2F03301M00JA00
OS	R4	2	RESISTOR 82.5 OHM .4W	DIGIKEY	PPC82.5YCT-ND
OS	R7	2	RESISTOR 27.4K OHM .4W	DIGIKEY	PPC27.4KYCT-ND
OS	R8	2	RESISTOR 100K OHM .4W	DIGIKEY	PPC100KYCT-ND
OS	R9	2	RESISTOR 1K OHM .4W	DIGIKEY	PPC1.00KYCT-ND
OS	P1	2	TRIM POT 25K BOURNES	DIGIKEY	3386P-253LF-ND
PS	DIY PSIT PS V1 R0	1	PC BOARD		
PS	R1-R6	6	3.3 OHM 5W RESISTOR		
PS	R7	1	RESISTOR 10 KOHM .4W	DIGIKEY	
PS	R8	1	3.6K 5W RESISTOR		
PS	C1	6	CAPACITOR 1000 UF 50V	DIGIKEY	493-12786-3-ND
PS	C2	1	CAPACITOR 10UF 50V EL		
PS	TH	1	POWER THERMISTOR		
PS	RLY	1	RELAY		
HW*	#6 SCREW*	8	#6-32 SCREW .5"L (TO-3 MOUNT)		
HW*	#6 NUT*	8	#6-32 LOCKNUT (TO-3 MOUNT)		
HW*	SPACER*	8	NYLON SPACER #6 HOLE .25"D X .25"L		
HW	#3 METRIC SCREW	16	CHANNEL MOUNT 12mm HEX		
HW	#3 METRIC WASHER	8	CHANNEL MOUNT		
HW	#6 SCREW	4	#6-32 SCREW .5"L		
HW	#6 NUT	4	#6-32 LOCKNUT		
HW	#6 WASHER	4	FE MOUNT		
HW	SPACER	12	NYLON SPACER #6 HOLE .25"D X .25"L		
FE	DIY PSIT FE V1 R0	2	SONY P VFET FE		
FE	XFRMR	2	TRANSFORMER	EDCOR	PC600/15K
FE	Q1	2	2SK370 N CHANNEL JFET		
FE	Q2	2	2SJ108 P CHANNEL JFET		
FE	R1, R4	4	RESISTOR 1K OHM .4W	DIGIKEY	PPC1.00KYCT-ND
FE	R2, R3, R5	6	RESISTOR 1 MEG OHM .4W		
FE	R6	2	RESISTOR 10K OHM .4W		
FE	R7	2	RESISTOR 47 OHM .4W		
FE	C1	2	CAPACITOR .33 UF PP	MOUSER	MKP2F03301M00JA00
FE	C2, C3	4	CAPACITOR 1000 UF 50V	DIGIKEY	493-12786-3-ND
FE	C4	2	CAPACITOR 220 PF PP	MOUSER	FKP20102201D00KSSD