

Designing and building an audio amplifier

To design a DIY amplifier I followed a few guide lines:

- Keep the topology as simple as possible. This servers the purpose of being easy to understand and build the circuit ; the sonic effect does not play a part in this guide line as I am not convinced that simplicity in it self makes a amplifier sound good or bad.
- Make it class A. If you're going to build something your self, why not make it something special, as in not readily available in the average shop. Further more class can be kept more simple then class AB. There is supposed to be a sonic effect too which can be arguments.
- Make it practical to build. No 400 Watt of heat to be dissipated because that not easily to get rid of
- Avoid capacitors, because the can be unstable in time and nonlinear.
- Make it as cheap a possible, this rules out special parts, large heat sinks and valves output stages.

This lead me to a couple of circuit topologies available through the internet: Andrea Cioffoli, Nelson Pass, Elliot Rode, John Linsely Hood, Glen Baddely, Hiraga, Jean-Marc Plantefève and some...

In Class A there a a few different topologies to examine:

- Single Ended resistor loaded Emitter Follower (MJ 5 Watt amp)
- Single Ended current source loaded Emitter Follower (Andrea Cioffoli)
- Single Ended resistor loaded Common Emitter (Eliot rode's experiment)
- Single Ended current source loaded Common Emitter (Nelson Pass's ZEN)
- Push-Pull stage (John Linsely Hood, Nelson Pass's Son of ZEN, Elliot Rode's Death of Zen, Glen Baddely, Hiraga)
- Cascode or Super Symmetry (patented); maybe in the future
- MOSFET's, IGBT's or BJT.

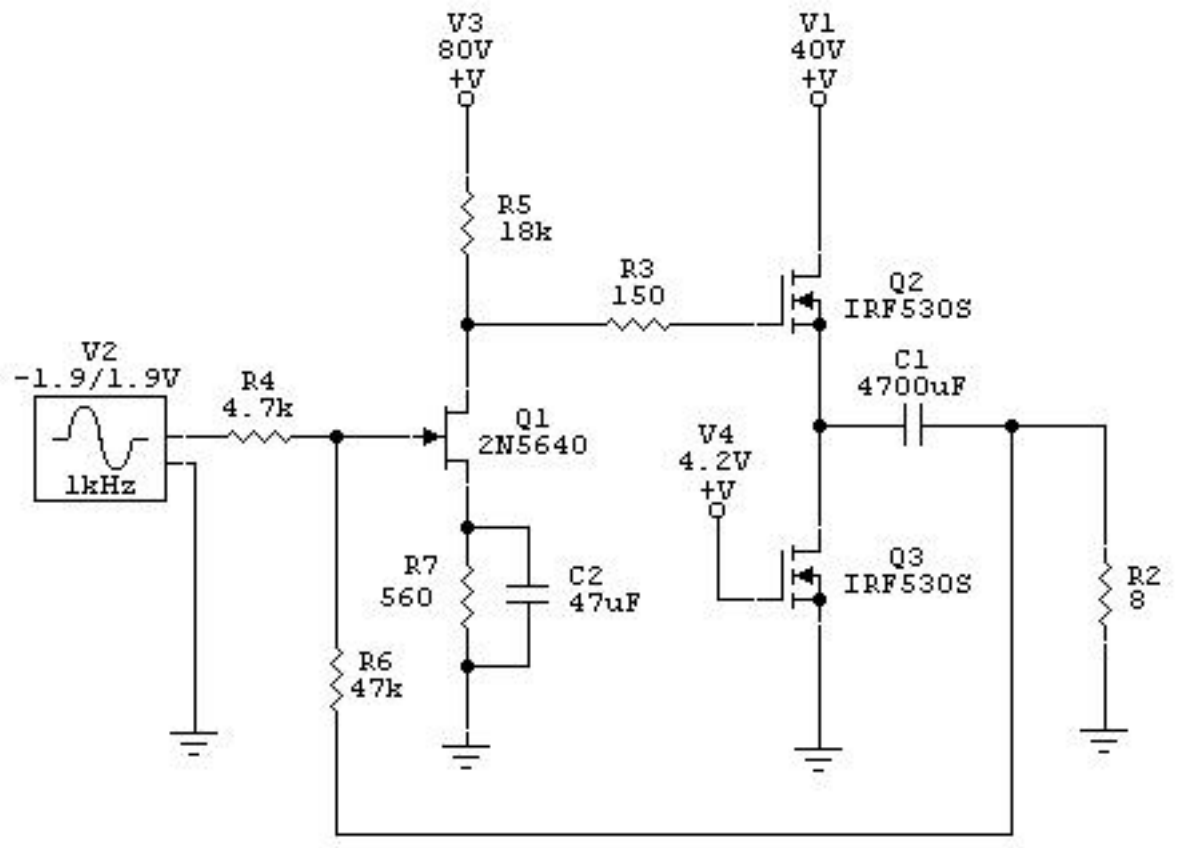
I have simulated extensively in the Circuitmaker2000 demo spice program and came to this topology

Power : 19 Watt in 8 Ohm, 102 Watt dissipated

distortion at 1 KHz, 1 Watt : 0.05 % all second harmonic

distortion at 1 KHz, 19 Watt : 0.25 % almost all second harmonic

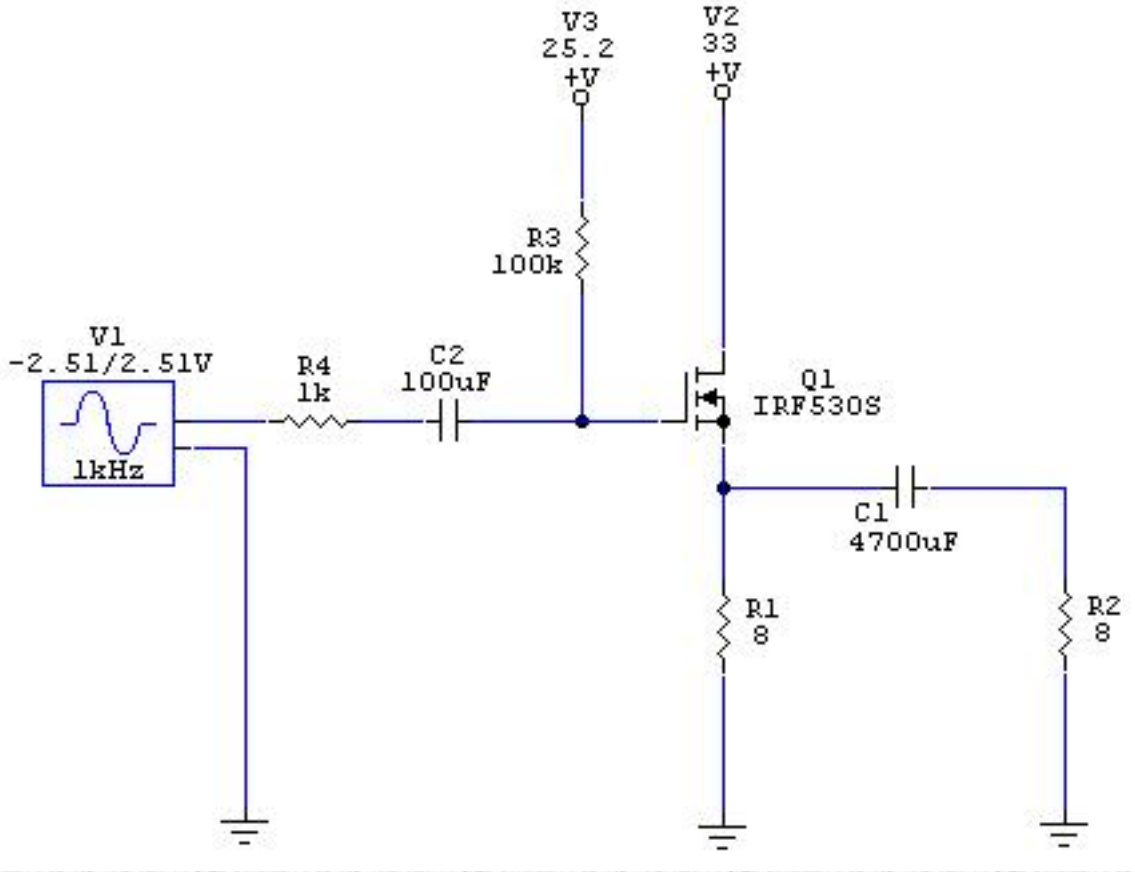
bandwidth : -0.5 dB at 10 Hz to 350 KHz



simple MOSFET source folower

generator:	1K Ohm	amperes:	2.618 Amp
device:	IRF530S	power@1%2/3rd:	7.558 Watt
z-Bias:	100K Ohm	dissipation:	86.39 Watt
Bias Voltage:	25.2 Volt	rendement:	8.749 %
z-source:	8 Ohm	gain:	0.908 x
output capacitor:	4700uF	Z-out:	0.2588 Ohm
supply:	33 Volt	-dB @ 10 Hz:	-0.6614 dB
z-speaker:	8 Ohm	-dB @ 100 kHz:	-0.0323 dB
rimple rejection:	0.648 %		

THD@0.33Watt	THD@1Watt	THD@3Watt
0.125 % 2nd	0.223 % 2nd	0.432 % 2nd
0.006 % 3rd	0.022 % 3rd	0.079 % 3rd



This amp was published in the MJ magazine and is therefore called the MJ-amp. I don't know must about the design, but in my spice simulator this little amp performs absolutely excellent. So much in fact that I suspect my simulator uses very simple models of the complementary transistors.

DC coupled, no capacitors, -0.5 dB at 2 MHz, less then 0.1 Ohm output resistance, 35 Watts power for 80 Watts dissipation, distortion ultra low at 0.00001 %@ 1 Watt, I choose 1.5 amperes idle for class A operation.

