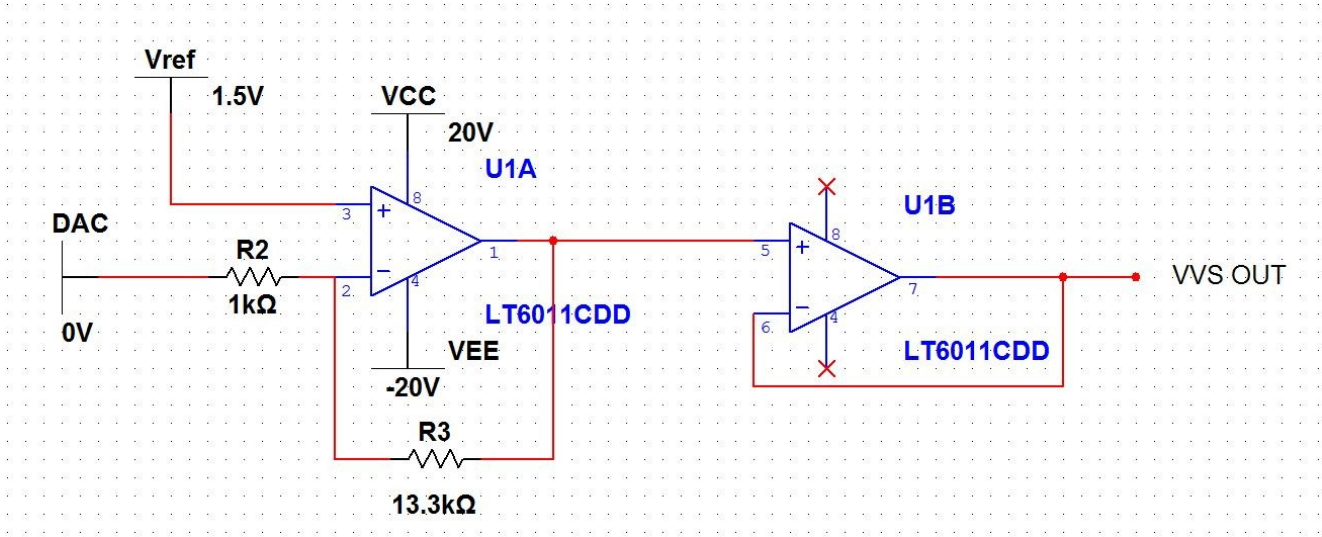
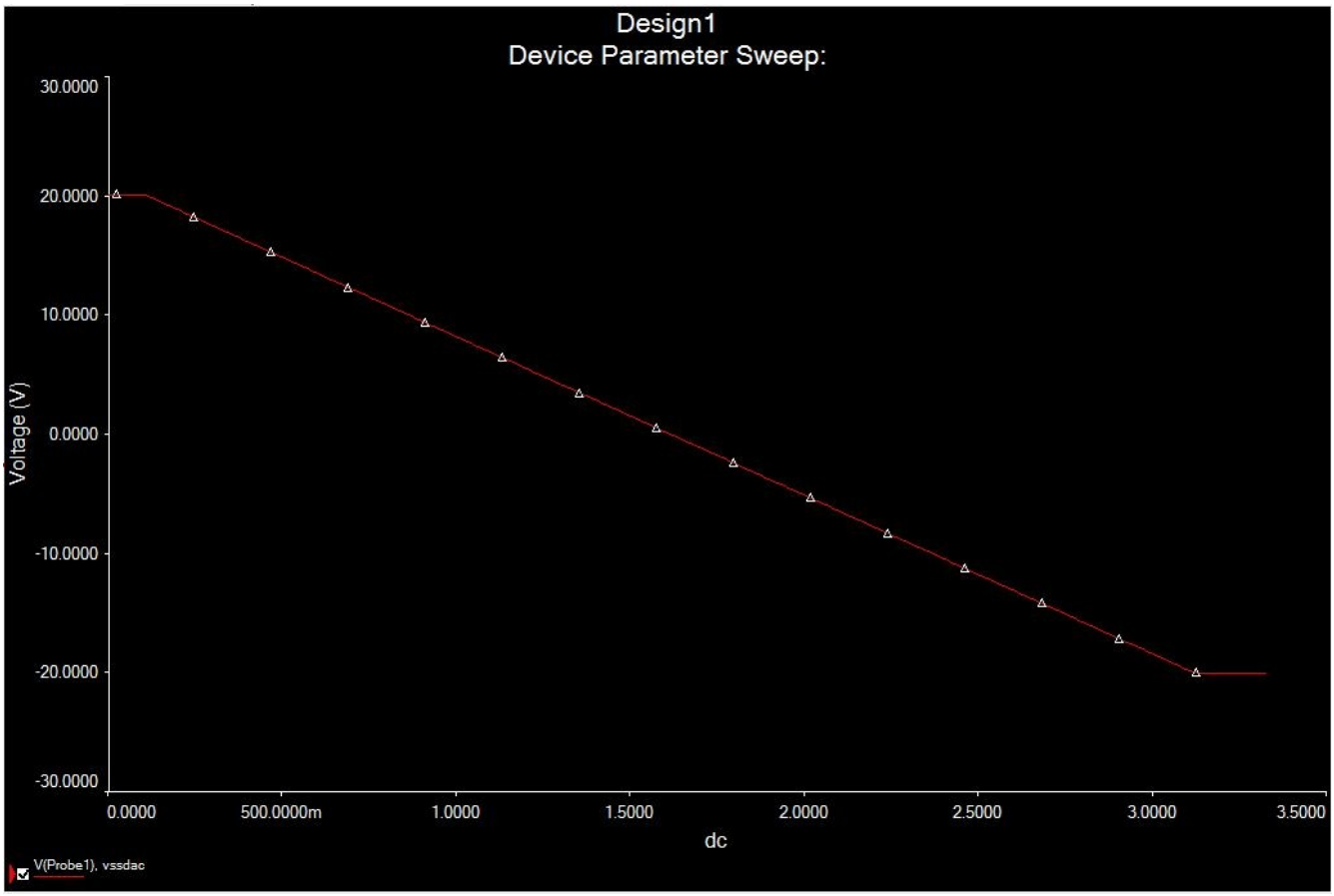
VVS subsystem update

Matthew Landavazo
February 8th, 2011.



Assuming the DAC is running on a 1.5V Vref and running the output range of 3x Vref, or 4.5V (I looked this up in the TI datasheet for the microprocessor, the highest it should actually swing is 3.3V) we can achieve +/- 20V operation by using an inverting amplifier and we can use the extra opamp on the package as a follower.



Differences in the opamp terminals are centered around 1.5v instead of ground to achieve bipolar operation. I figured an overshoot in the input would give us some breathing room to achieve the full range out of the DAC as it's recommended we have 256 steps, but with a 12bit DAC we get 4096.

Simulations show full swing going from 20 to -20V from 0 to about 0 to 3.33V DAC out, which should be perfect, because that's all we can achieve from the CPU. If for some reason it doesn't meet the full swing we can use a higher gain or adjust Vref

I ended up replacing the op-amps that Taylor used because I noticed a flaw with them, their absolute maximums only cater to +/- 18. I swapped them out for a op-amps designed for rail to rail operation for up to 40V difference on the rails.

http://download.siliconexpert.com/pdfs/2007/11/04/semi_ap/manual/ltc/operational%20amplifier/60112fb.

The LT6011 should be great for this operation and should give us the full +/- 20 swing we need. The Taylor op-amps can still be used for overall design testing and can be swapped out if we order these new amps.

We can get them in several packages, a package with pin pads measuring 3mm x 3mm. For testing it's probably more convenient to use the bigger S8 and MS8 packages. High grade bins of this part have the suffix "A" on the part number, so for example:

LT6011DD <-- standard grade
LT6011ADD <--- high grade

suffixes after that denote the package type.