

EL84 PP amp

Differential preamp simulations

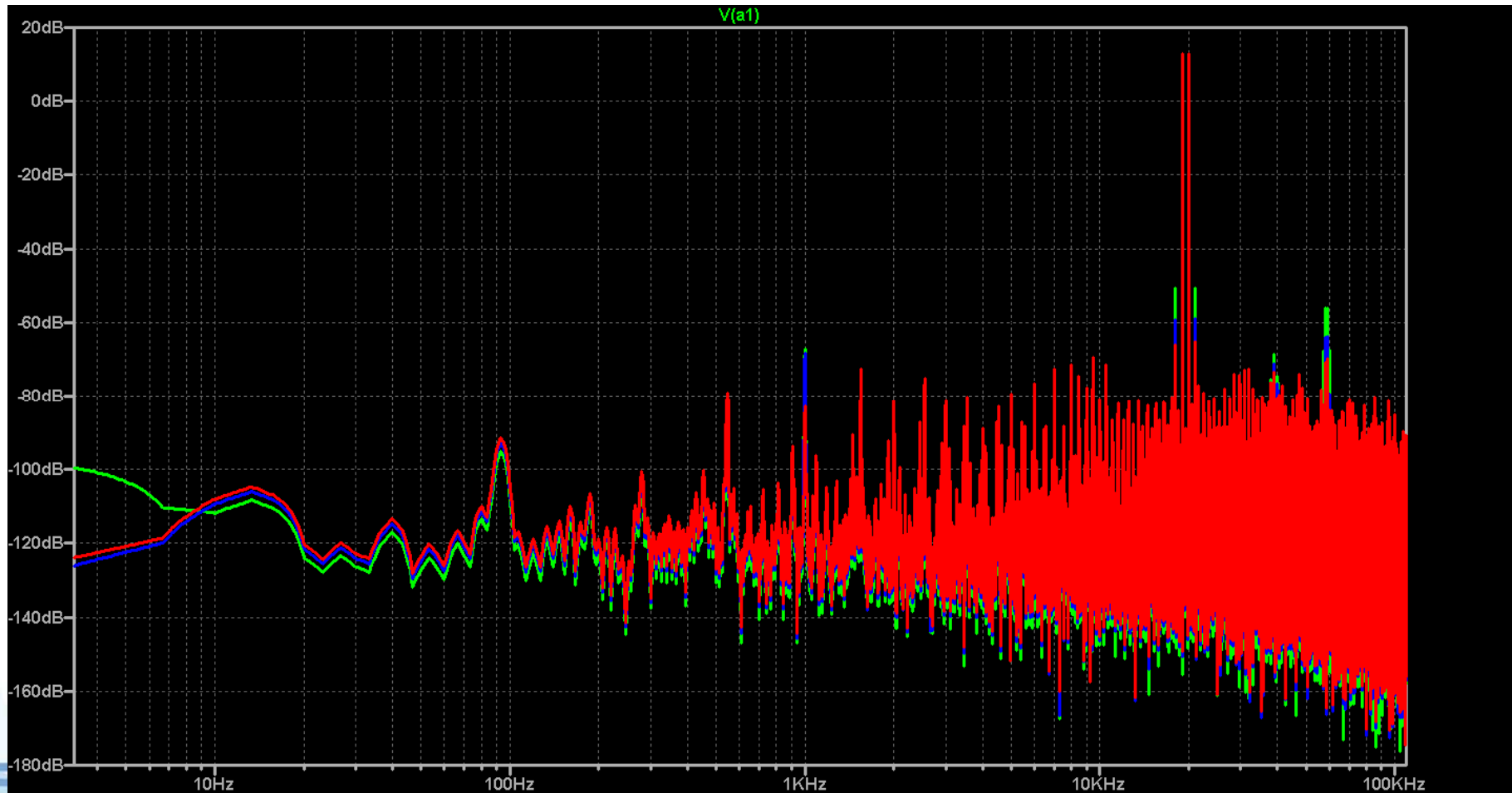


Introduction

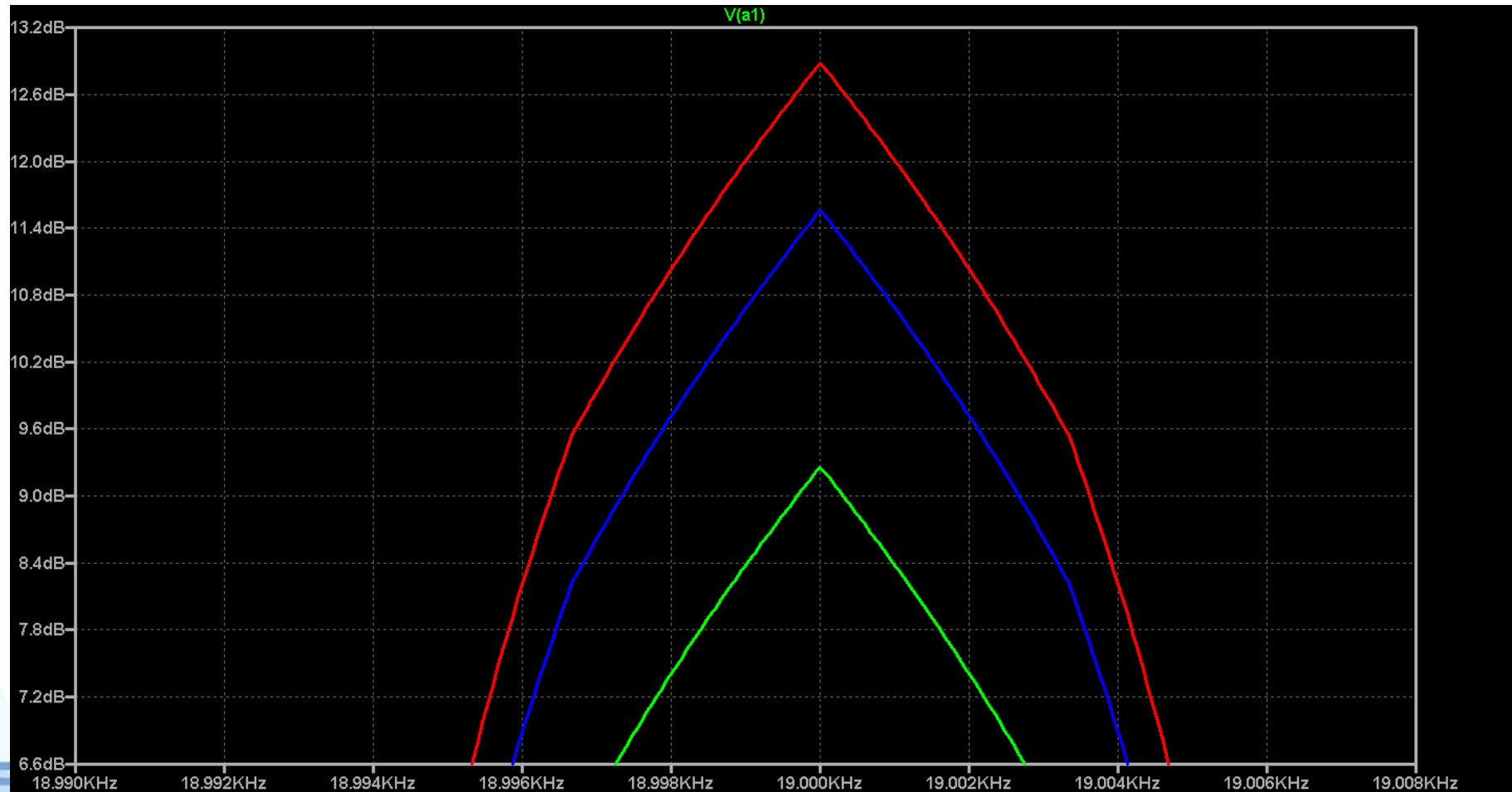
- Two anode signals are summed
- First simulation with equal tube models
- Second simulation with different ECC83 models
- Each simulation is run 3 times using different bias currents: 0.75, 1.5 and 3.0 mA



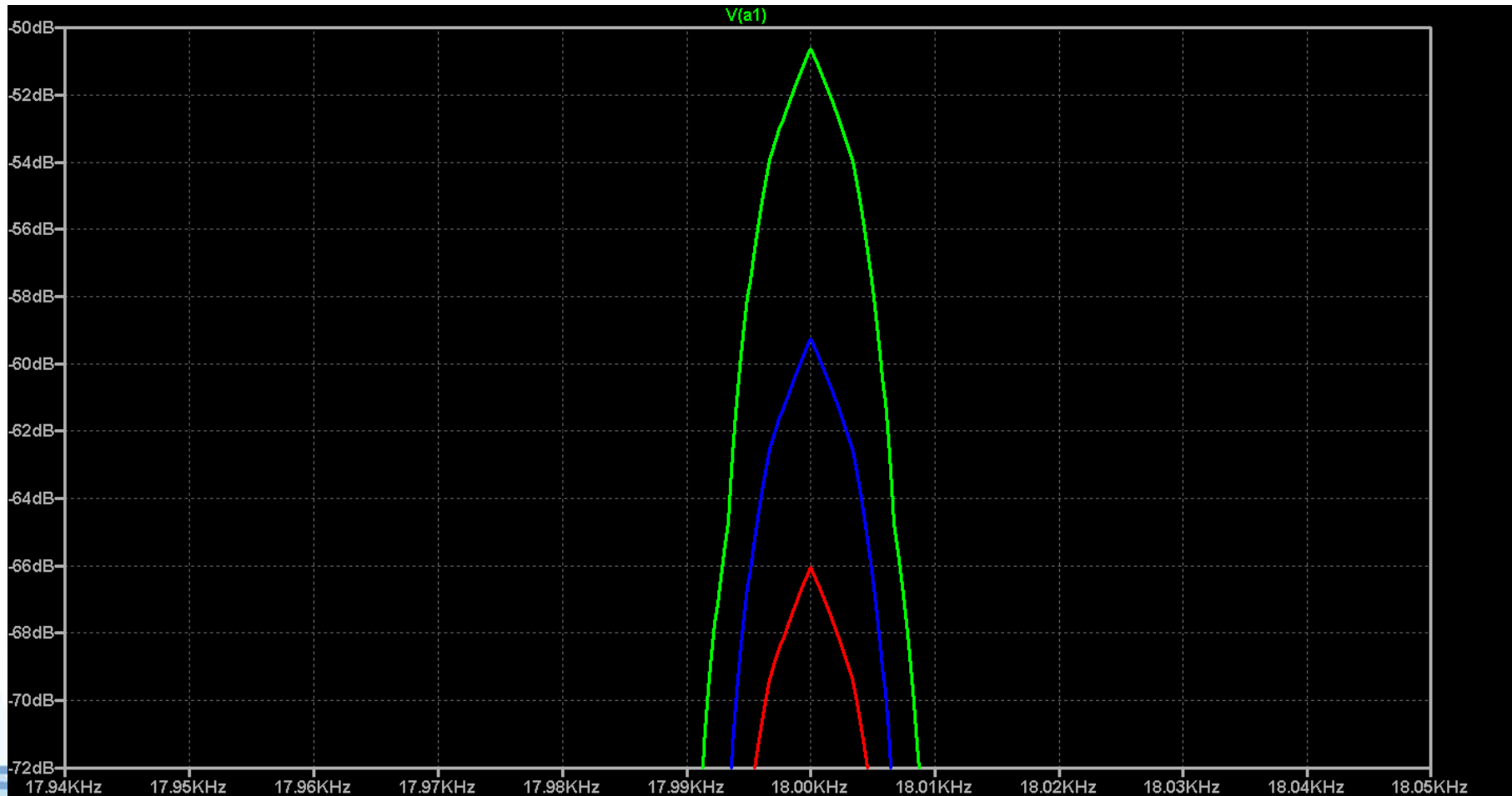
IMD at different I_a (overview)



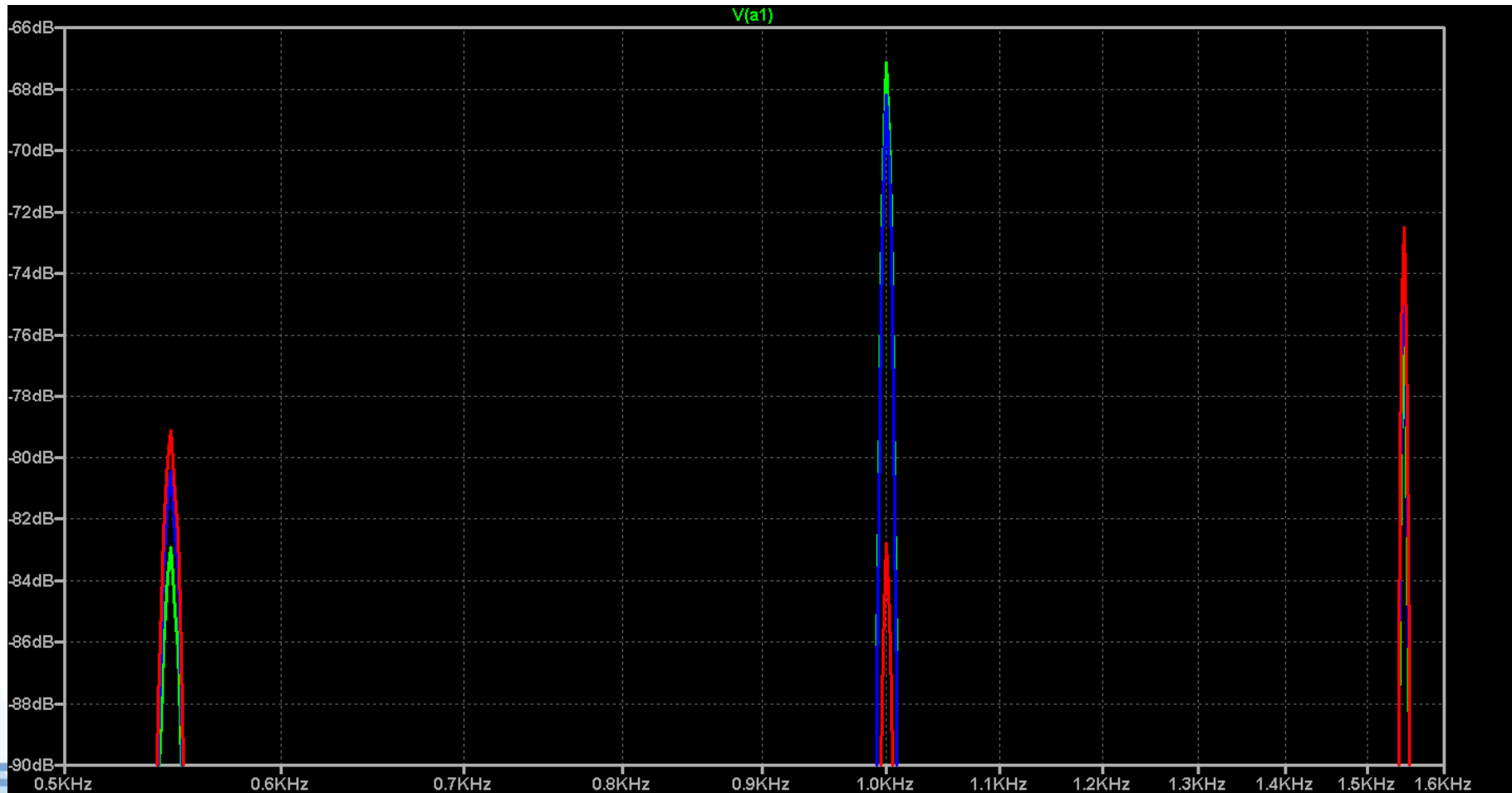
IMD at different Ia (19 kHz)



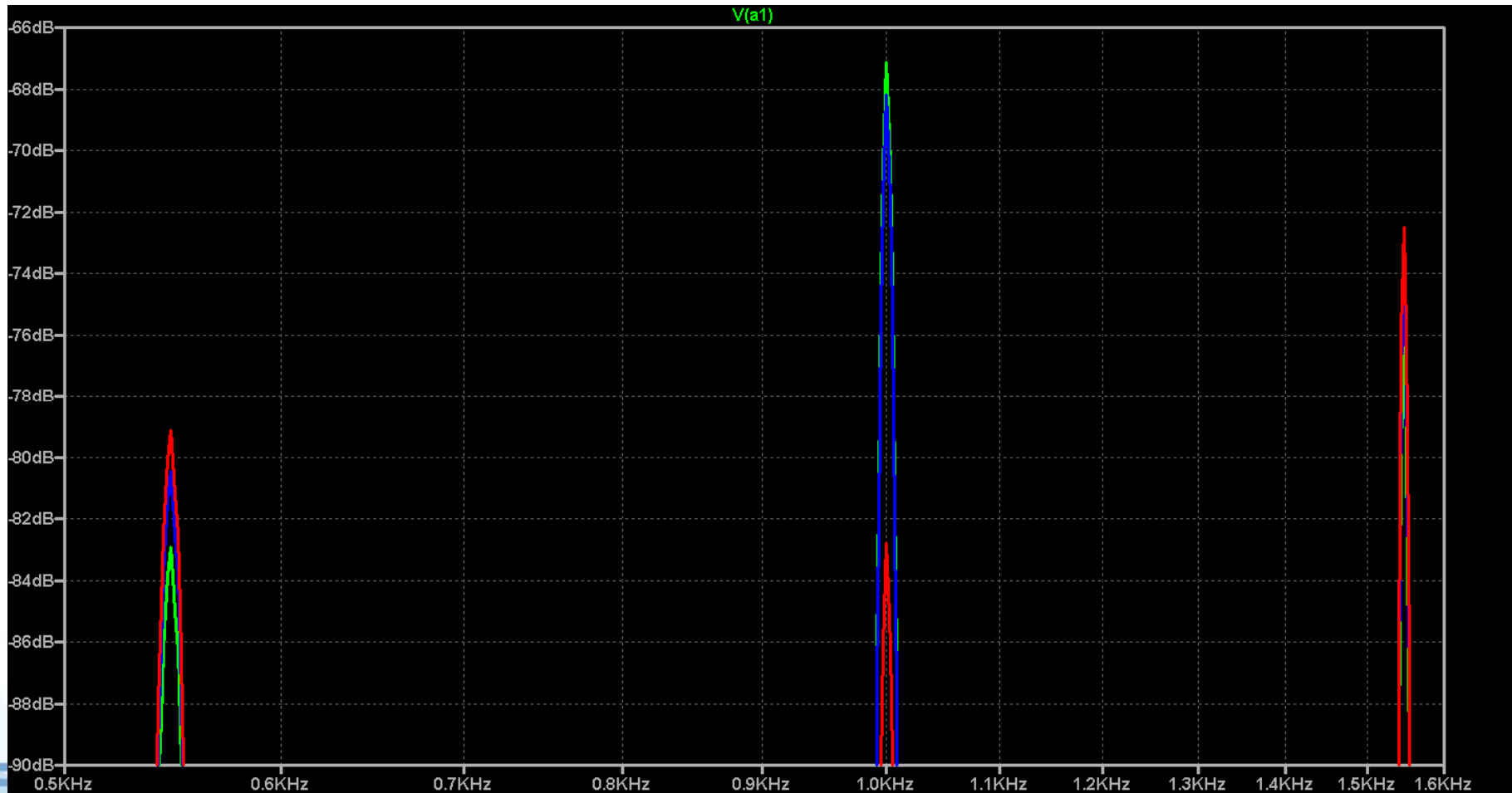
IMD at different I_a (18 kHz)



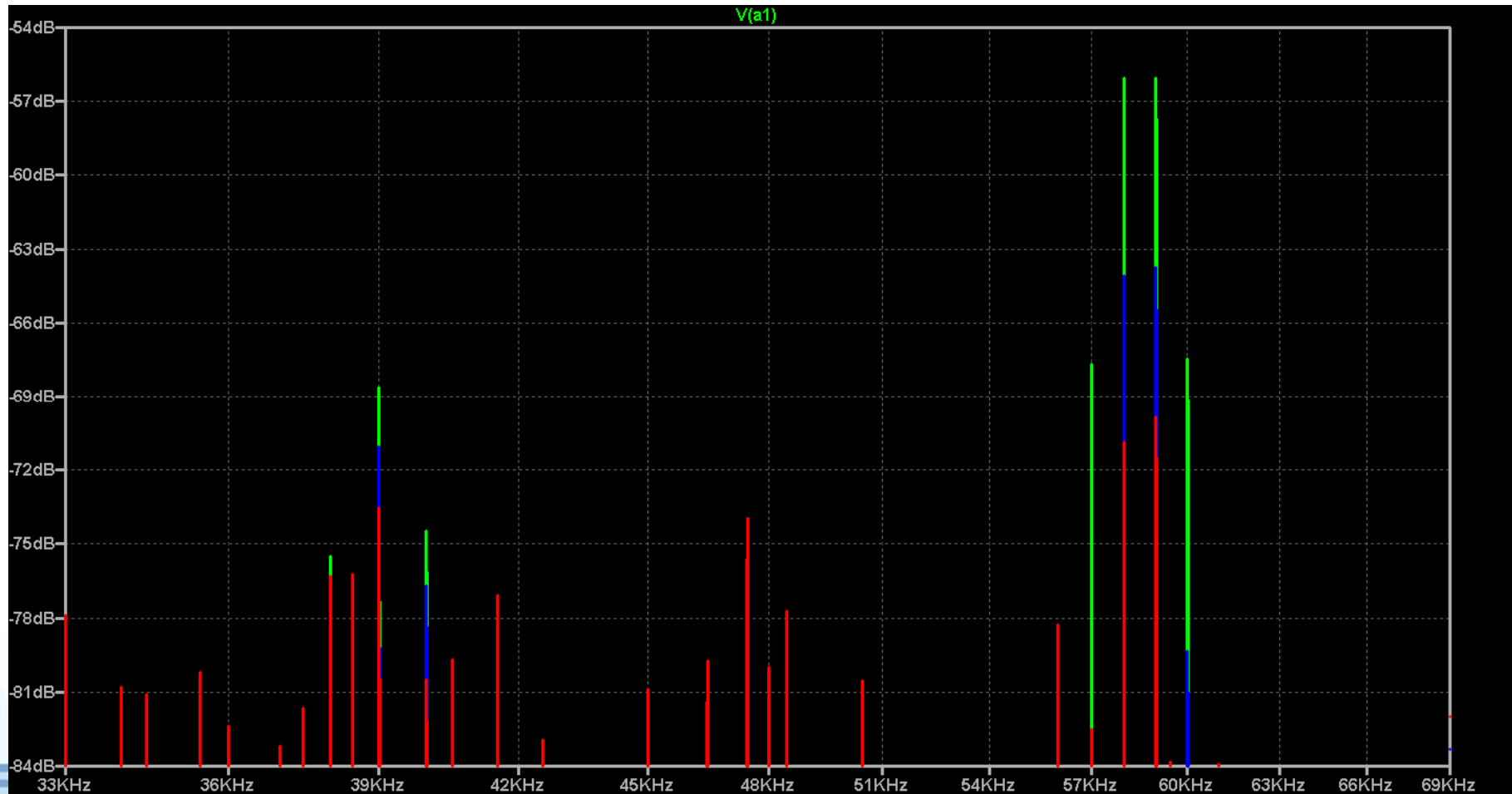
IMD at different I_a (1 kHz)



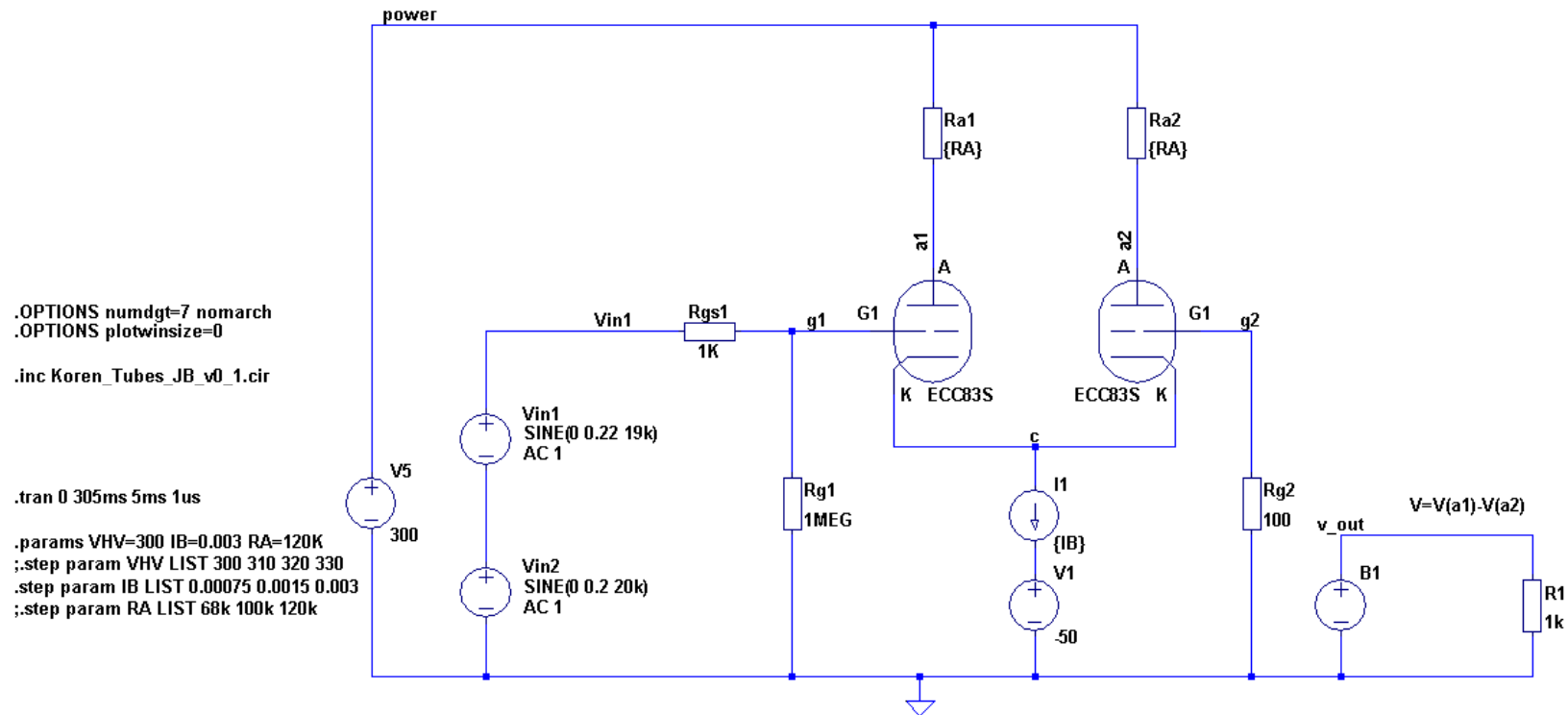
IMD at different I_a (1 kHz)



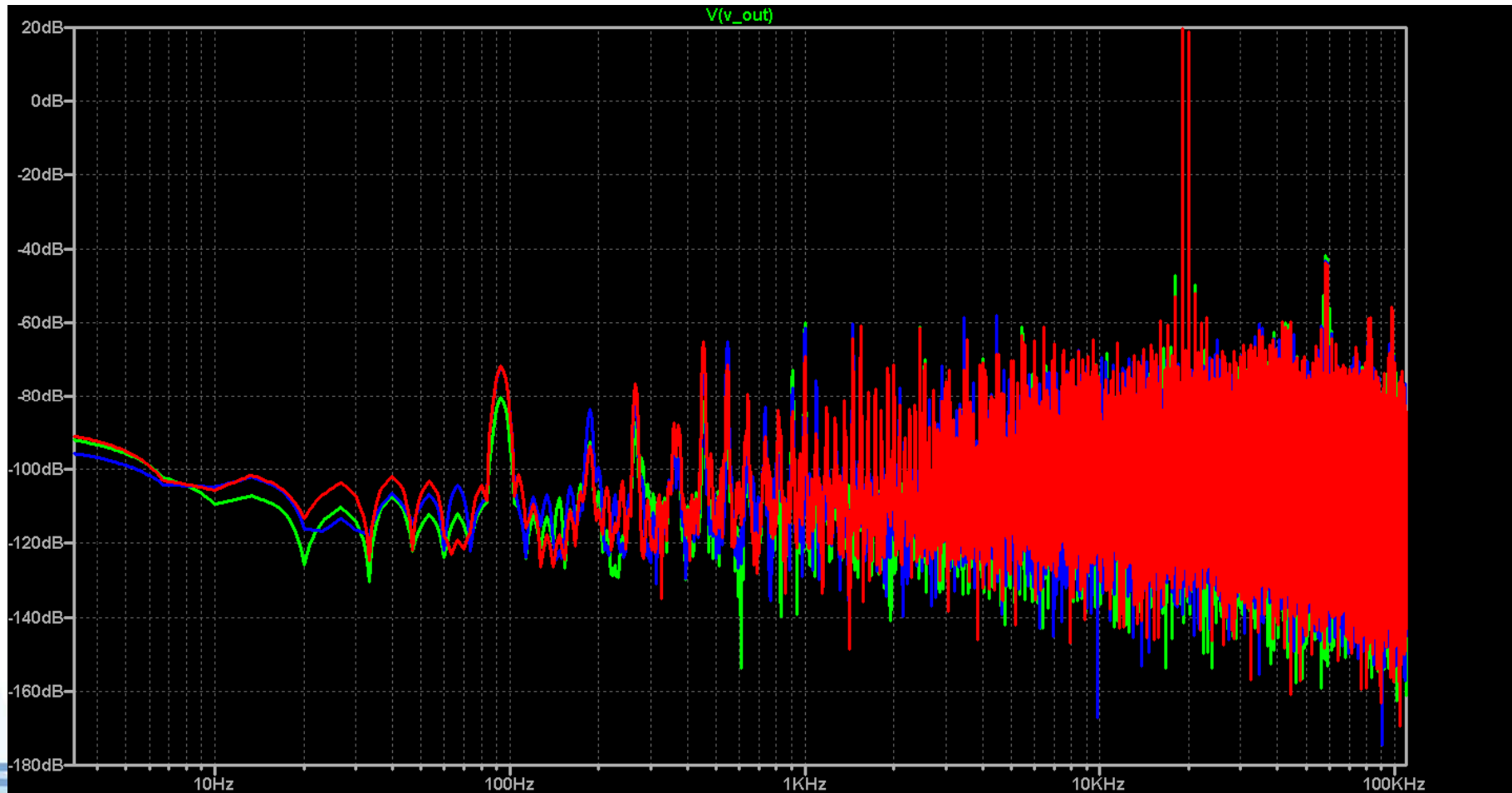
IMD at different Ia (58 kHz)



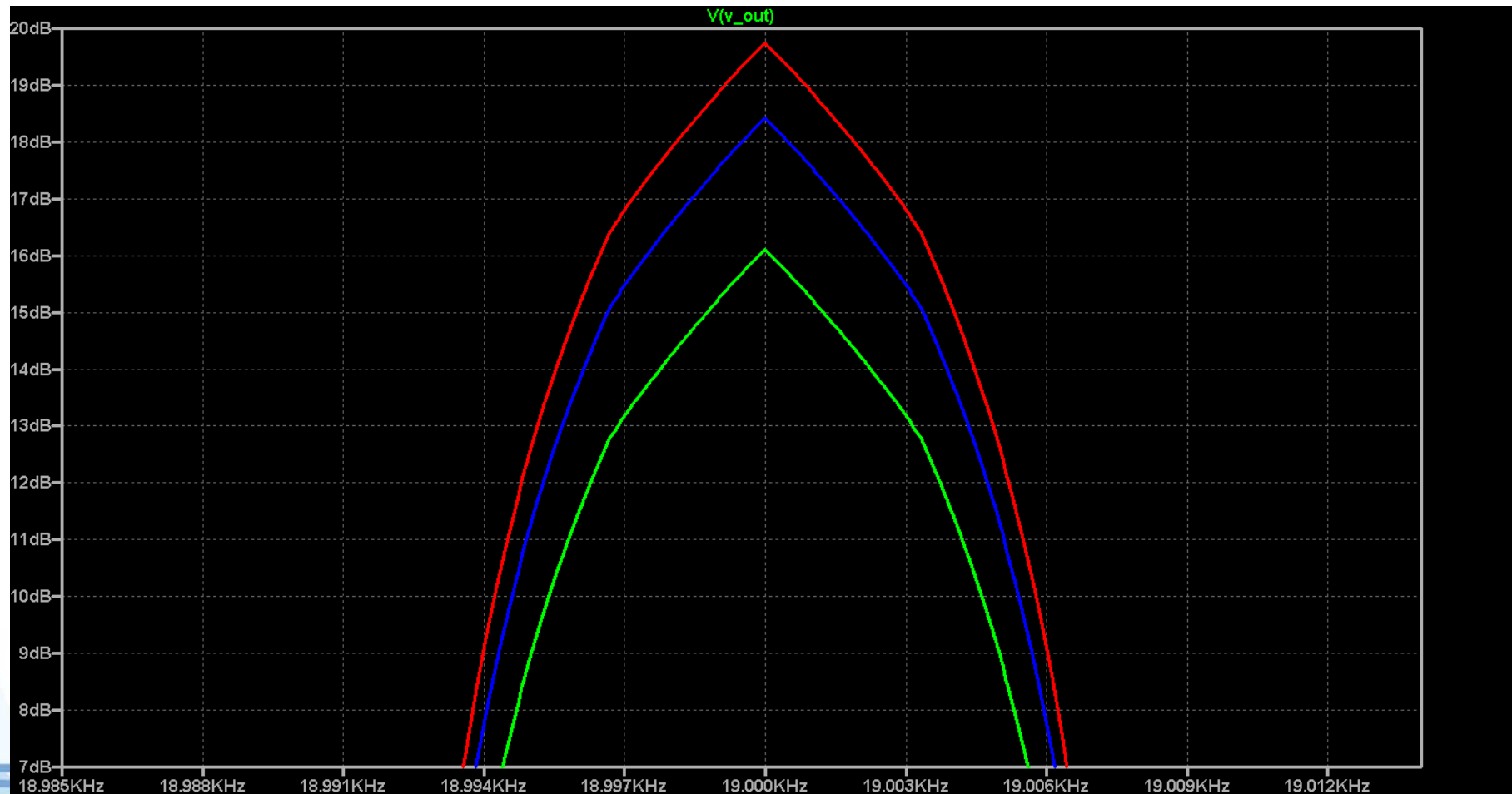
Simulation circuit



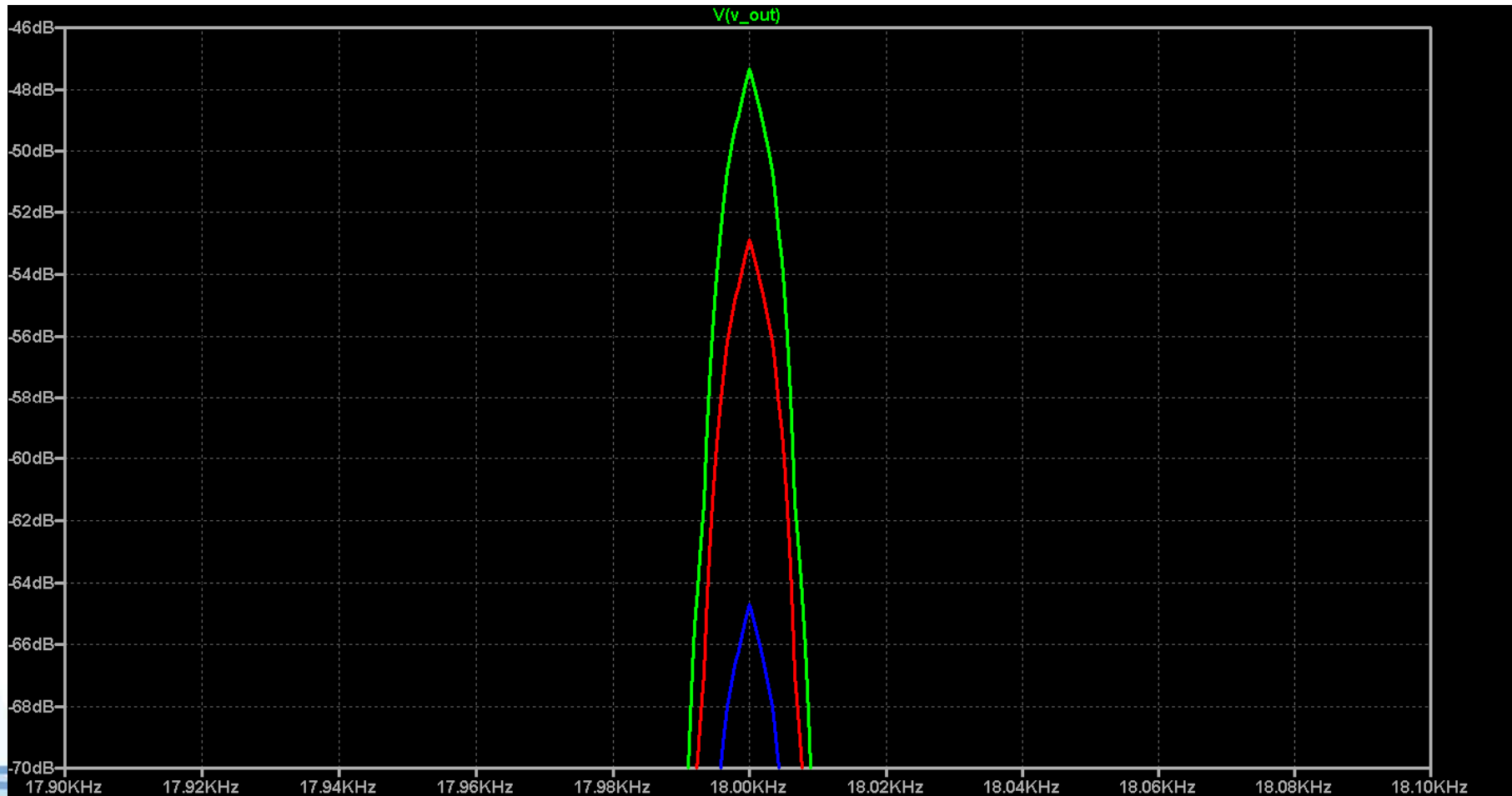
IMD V(a1)-V(a2) overview



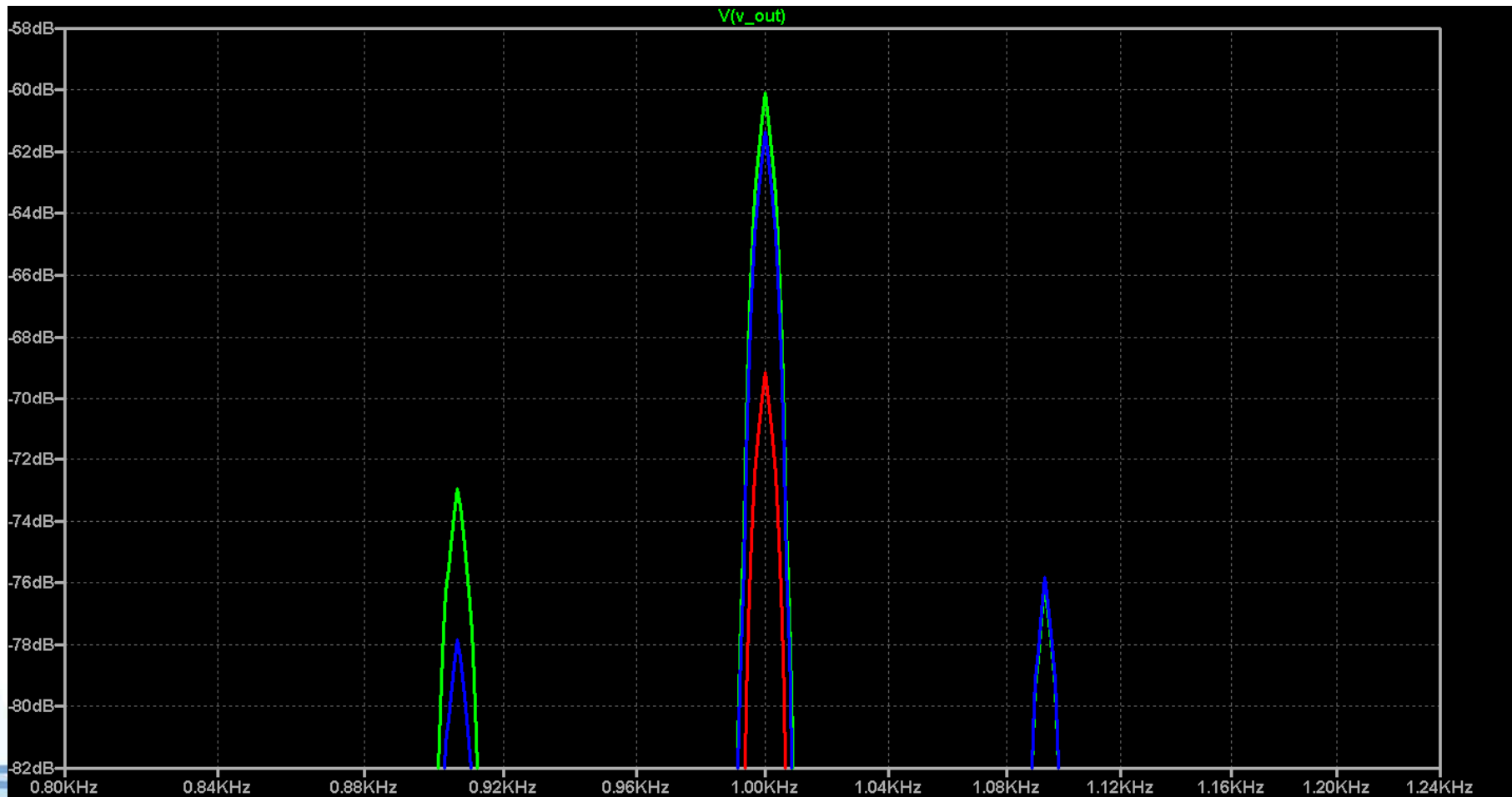
IMD V(a1)-V(a2) 19 kHz (&20 kHz)



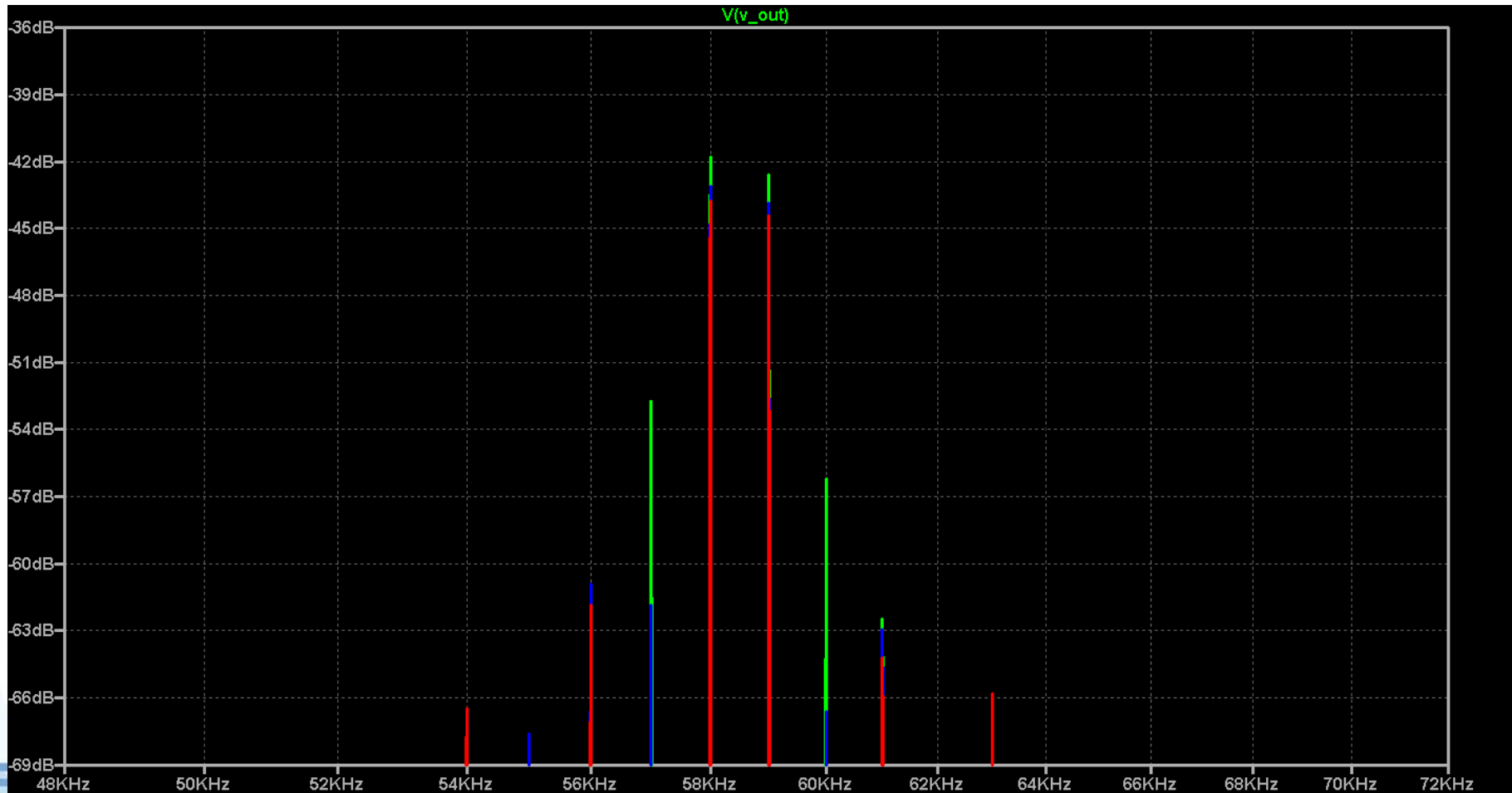
IMD V(a1)-V(a2) 18 kHz



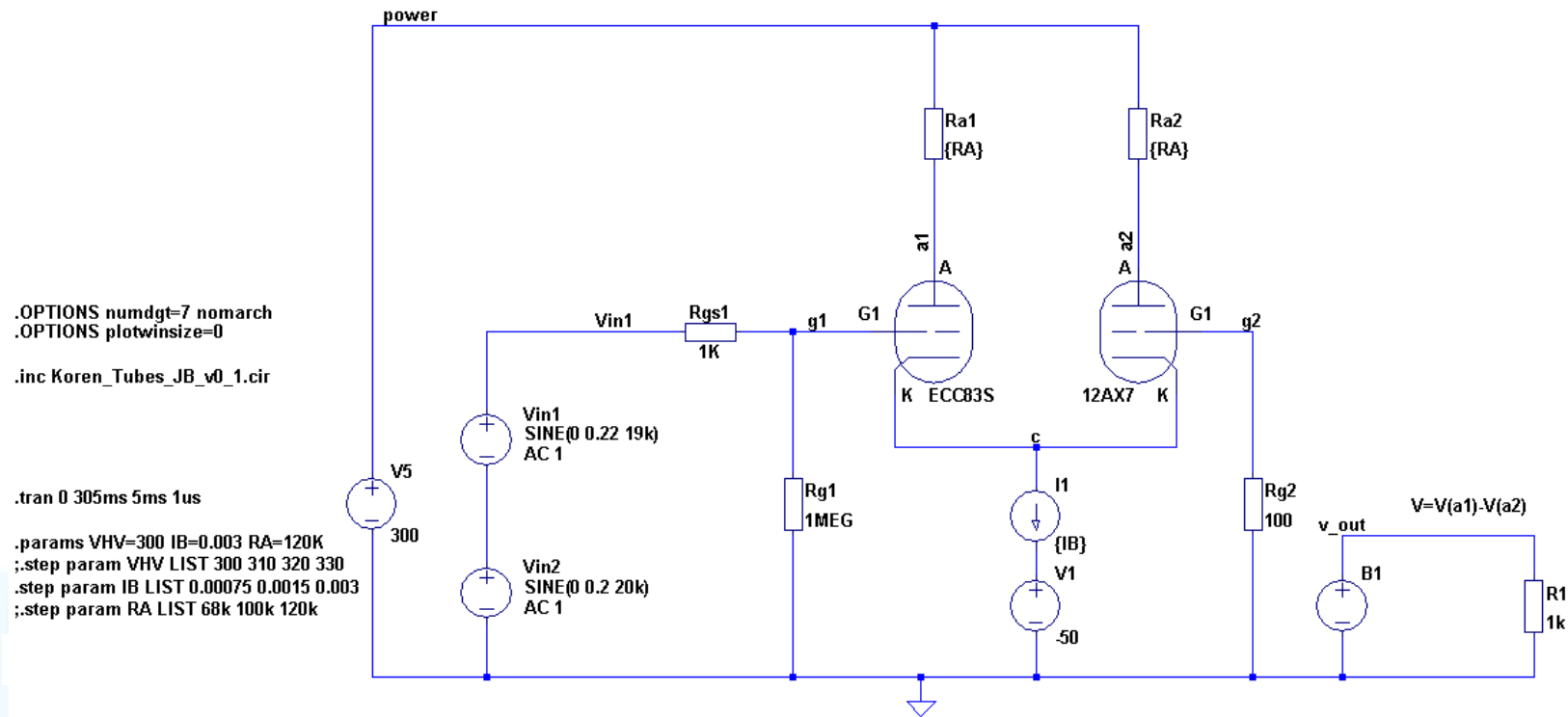
IMD V(a1)-V(a2) 1 kHz



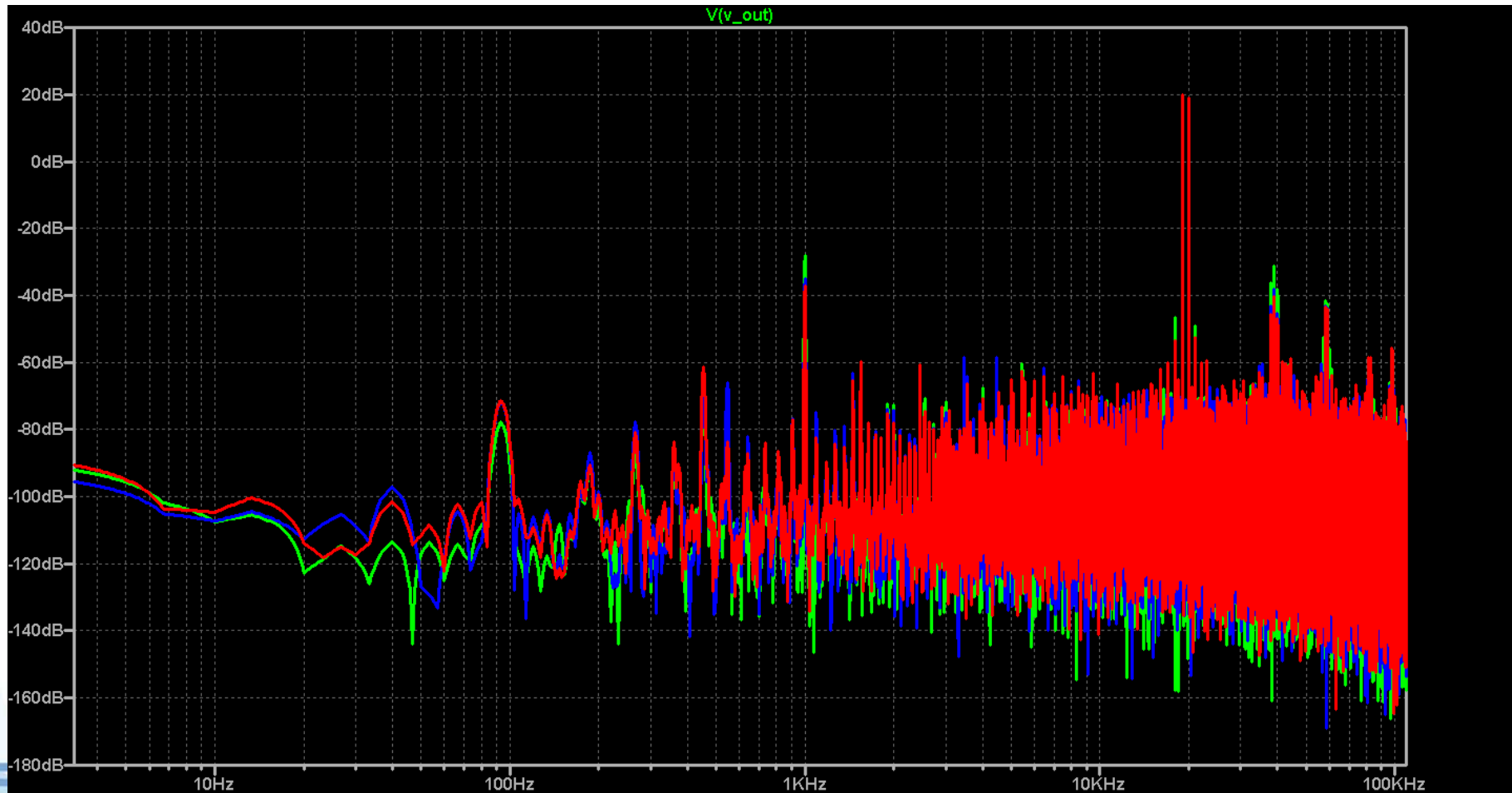
IMD V(a1)-V(a2) 58 kHz



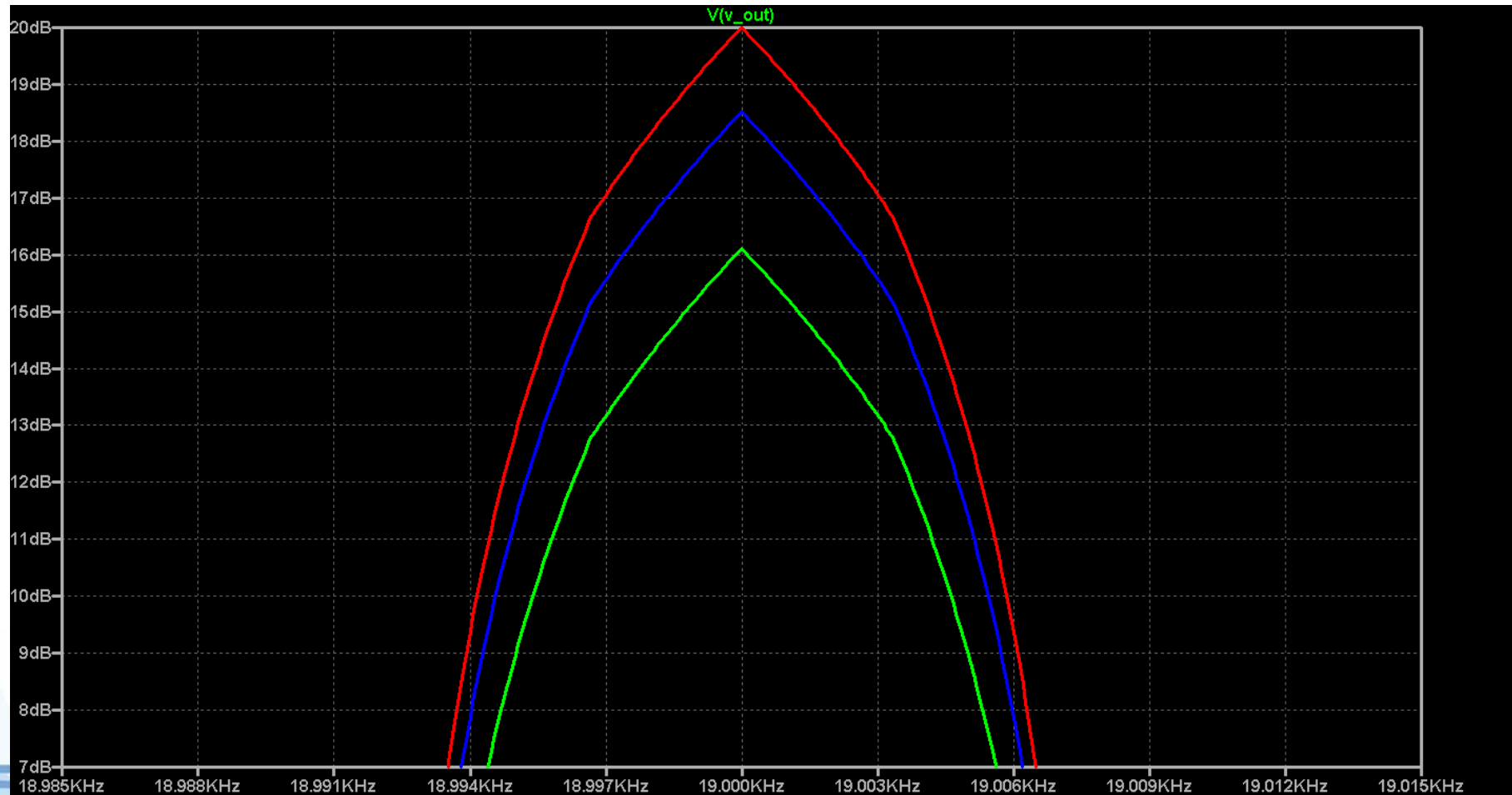
Simulation circuit



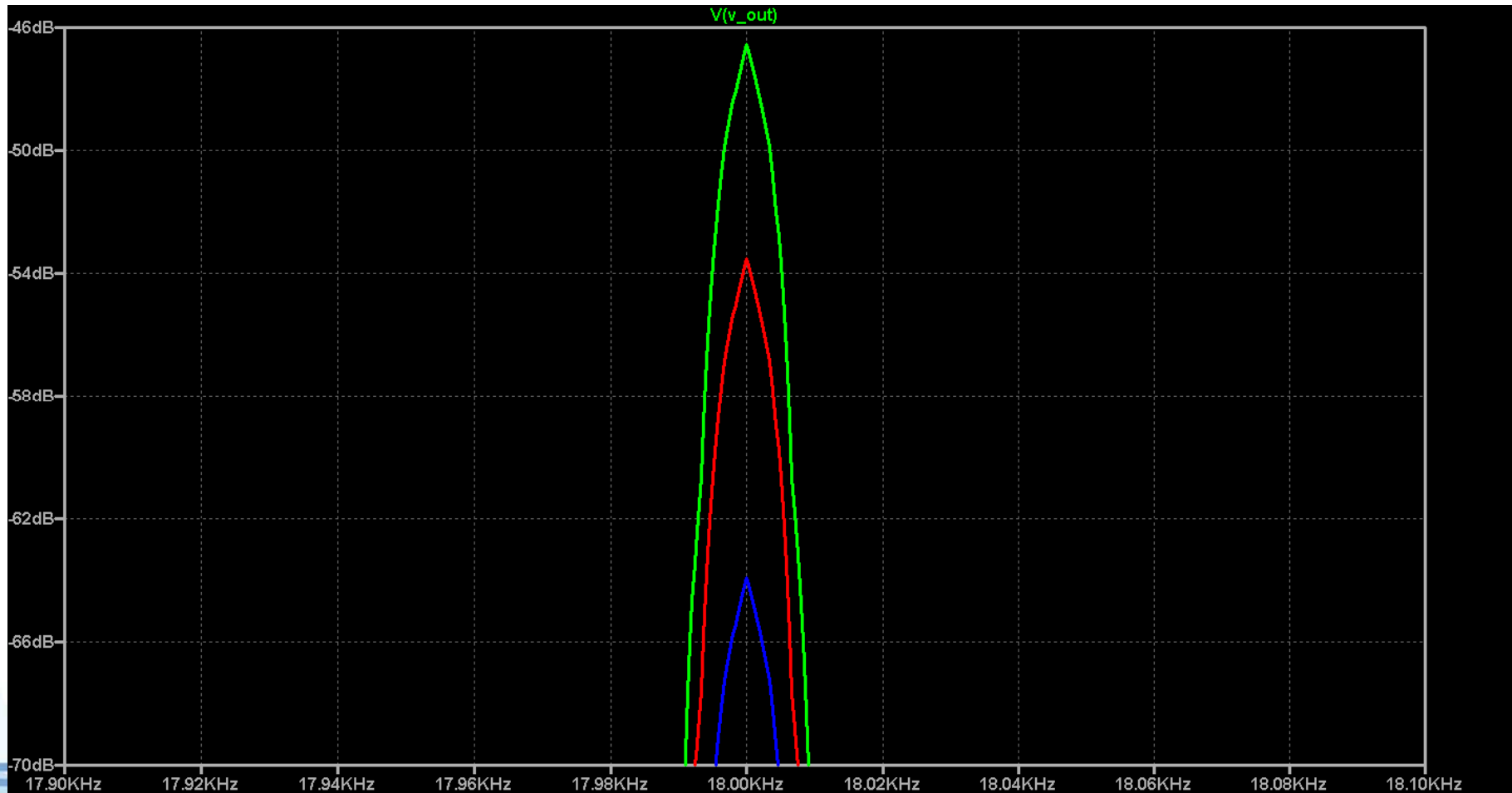
IMD V(a1)-V(a2) overview



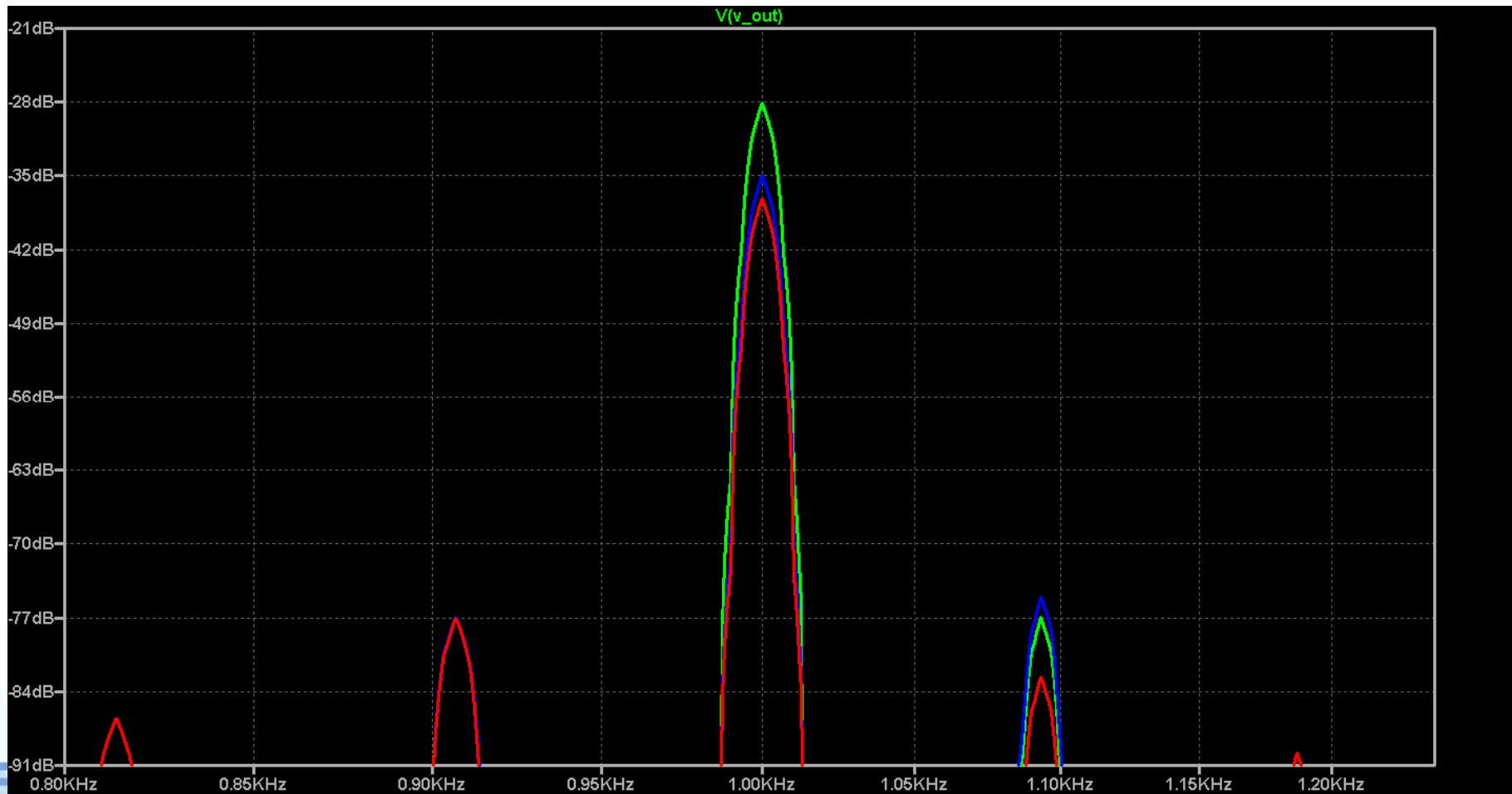
IMD V(a1)-V(a2) 19 kHz (&20 kHz)



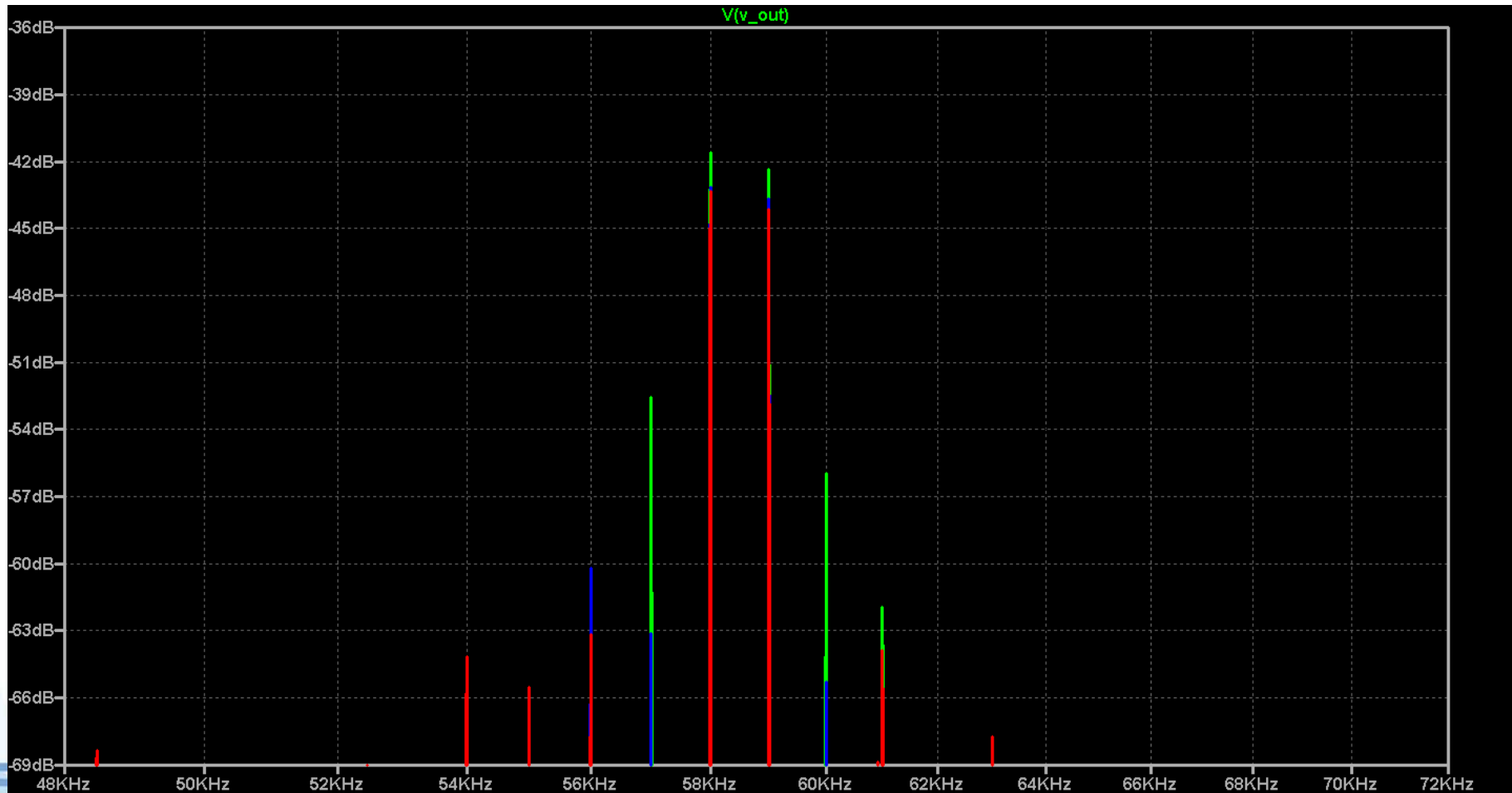
IMD V(a1)-V(a2) 18 kHz



IMD V(a1)-V(a2) 1 kHz



IMD V(a1)-V(a2) 58 kHz



Initial conclusions

Using LTSpice it is not possible to calculate IMD in terms of % (can be done to calculate THD)

Analyse effects based on FFT, main distortion component is $20 - 19 = 1$ kHz

Equal tube models: - 60 / - 61 / - 69 dB (slide 13)

Different tube models: - 28 / - 35 / - 37 dB (slide 19)

Note: Different values are the different runs (bias current 0.75, 1.5 and 3.0 mA)

IMD with different tube models (thus different characteristics) demonstrates a significantly higher distortion (~30 dB higher)

