

SET DC Curve Tracer - Noise Models

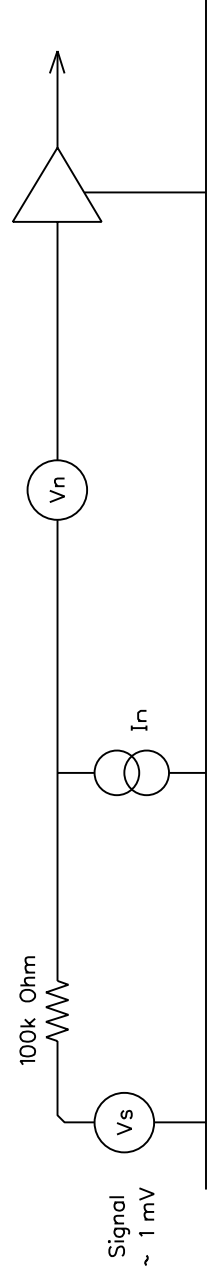
Typical Values for a Good Single-Ended JFET at Low Frequency

100k Ohm
 Source Resistance
 ~40 nV / root Hz
 Johnson Noise Voltage

Amplifier Input Current Noise
 ~2 fA / root Hz

Amplifier Input Voltage Noise
 ~30 nV / root Hz

Noiseless Amplifier



Total noise at the input to the noiseless amplifier is the sum in quadrature of:

Source Johnson Noise ~40 nV / root Hz
 Amplifier Current Noise ~2 fA / root Hz x 100k Ohm = ~20 nV / root Hz
 Amplifier Voltage Noise ~30 nV / root Hz
 Total noise at the input = ~54 nV / root Hz

This value needs to be multiplied by at least a factor of 2 because the real circuit uses differential amplifiers and both the channel current amplifier and the source-drain voltage amplifier will force noise across the 100k Ohm resistor.

Even ~200 nV / root Hz of noise and a 100 Hz bandwidth would result in 2 uV rms of noise vs 1 mV of signal.

A frequently used alternative low frequency noise specification for amplifiers is the total peak to peak input noise in the two decade frequency range from 0.1 Hz to 10 Hz. Typical values for good JFET amplifiers are in the range 0.5 to 4 uV peak-peak.

Notes: The noise current in the JFET basically just tracks the bias current. The bias current has a strong temperature dependence increasing by about a factor of 2 per 10 deg C.

