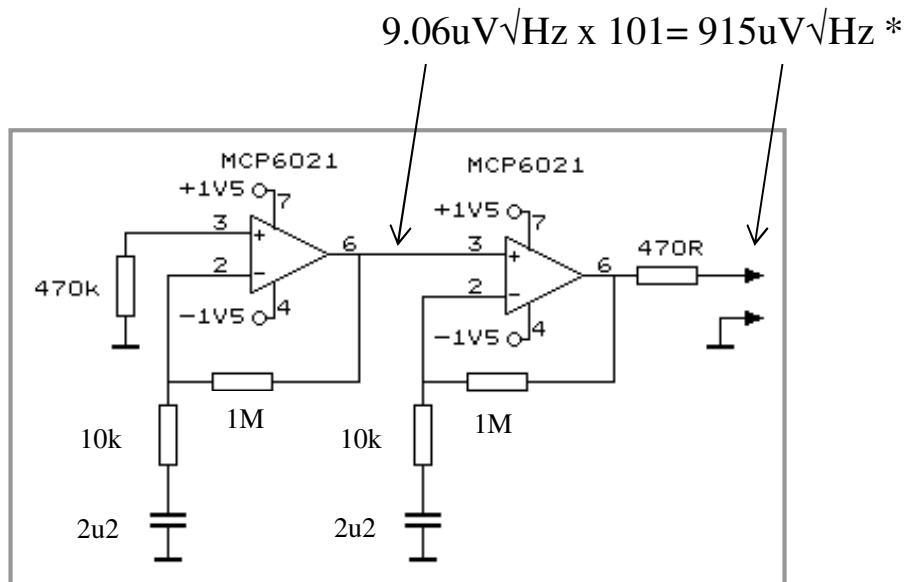
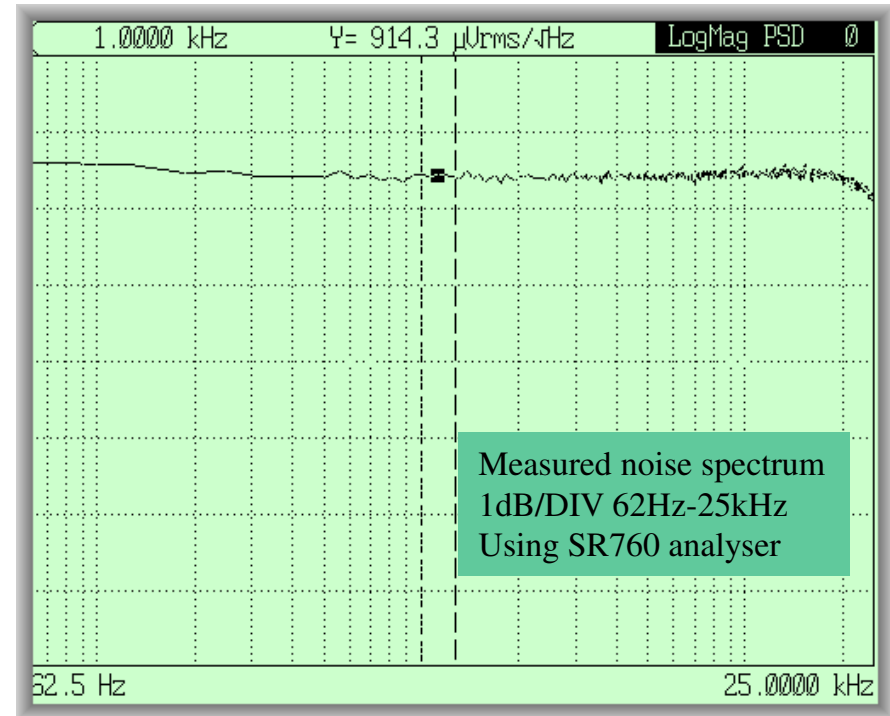


Audioband noisource using resistor thermal noise (kT)



Use two single opamps, do not use one dual package



Calculations for output noise density: (@298 Kelvin=25°C)

$$470k = 88nV/\sqrt{Hz} \times 101 = 8888nV/\sqrt{Hz} \times 101 = 898 \text{ uV}/\sqrt{Hz}$$

$$10k = 13nV/\sqrt{Hz} \times 101 = 1313nV/\sqrt{Hz} \times 101 = 133 \text{ uV}/\sqrt{Hz}$$

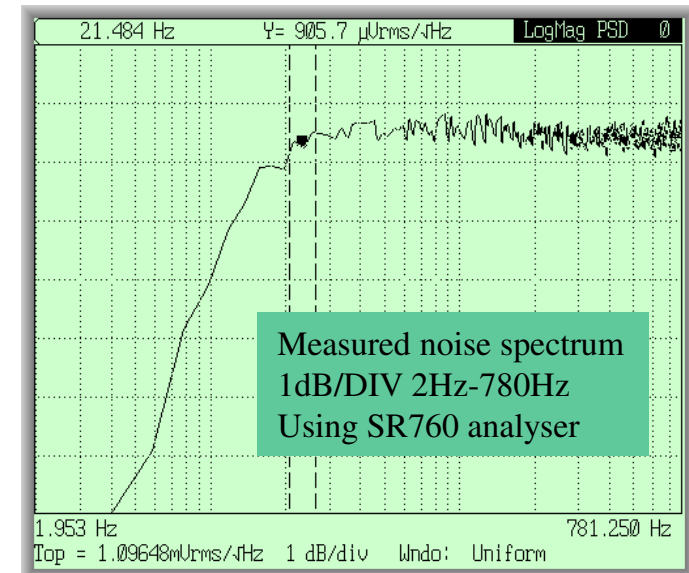
$$1M = 128nV/\sqrt{Hz} \times 1 = 128nV/\sqrt{Hz} \times 101 = 13 \text{ uV}/\sqrt{Hz}$$

$$U1 = 11nV/\sqrt{Hz} \times 101 = 1111nV/\sqrt{Hz} \times 101 = 112 \text{ uV}/\sqrt{Hz} \text{ @1kHz}$$

$$\text{Sum} = \sqrt{(898^2 + 133^2 + 13^2 + 112^2)} = 915 \text{ uV}/\sqrt{Hz} \text{ @1kHz}$$

Calculated output noise density : 915uV/sqrt(Hz) @1kHz

Measured output noise density : 914uV/sqrt(Hz) @1kHz



*Note: the noise contribution of the 2nd stage is <0.01% so it can be neglected here