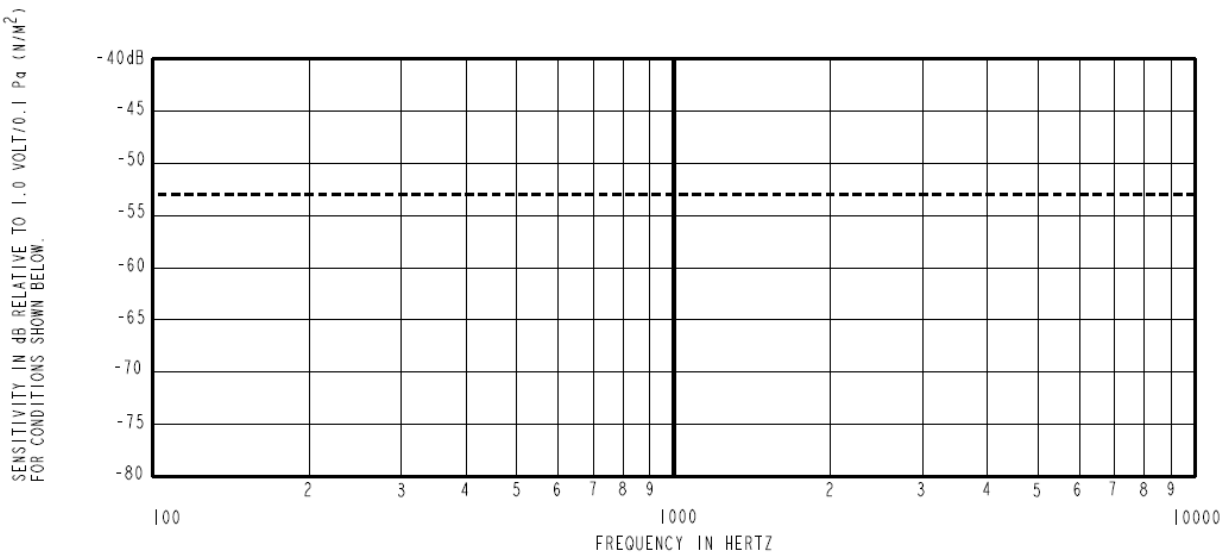
The electret condenser mic in the bottom left-hand corner FG-23329 is the world's smallest – it is only 1/10" in diameter, and has a ***flat*** frequency and phase response out to $f \sim 10\ KHz$:



From the graph of the frequency response of this electret condenser microphone, note that the sensitivity of this microphone is given as –53 *dB* referenced to 1.0 *Volt*/0.1 *Pascal* (*N*/*m*^{2}).

This means that for an over-pressure amplitude of $p = 0.1\,Pascals$, the voltage amplitude V_{p-mic} output from the device is $-53\,dB = 20\log_{10}\left(V_{p-mic}/1.0\right) = 10\log_{10}\left(V_{p-mic}/1.0\right)^2$ or $V_{p-mic} = 1.0\times10^{-53/20} = 10^{-2.65} = 2.24\,mV$.

For an over-pressure amplitude of $p = 1.0\,Pascals$ (corresponding to a sound pressure level *SPL* = 94.0 *dB*), this corresponds to a 10× larger voltage output from this device, of $V_{p-mic} = 22.4\,mV$. The ***sensitivity*** of this pressure microphone is thus:

$$S_{p-mic} \equiv V_{p-mic}/p = 2.24\,mV/0.1Pa = 22.4\,mV/1.0Pa = 22.4\ mV/Pa$$

Absolute calibration of a pressure microphone/measurement of the sensitivity of the pressure microphone S_{p-mic} is carried out by placing it *e.g.* in a monochromatic (*e.g.* f = 1.0 *KHz* sine-wave) ***free-air*** sound field $\tilde{S}(\vec{r},t)$ at *NTP* with a *SPL* = 94.0 *dB* {set using *e.g.* a NIST-calibrated *SPL* meter (*C*-weighting) in proximity to the microphone}. This *SPL* corresponds to an over-pressure amplitude of $p = 1.0\,Pascals$, since $SPL(dB) = 20\log_{10}(p/p_0)$ where $p_0 = 2\times10^{-5}\,Pa$ is the reference pressure at the (average) threshold of human hearing. The *AC* voltage amplitude V_{p-mic} output from the pressure microphone immersed in a *SPL* = 94.0 *dB* free-air sound field can be easily measured *e.g.* on an oscilloscope or a true *RMS* digital multi-meter.

In the UIUC Physics 406 POM lab, we use the Knowles Electronics FG-23329 subminiature electret condenser microphone capacitively coupled to a 11× gain low-noise non-inverting op-amp preamplifier, the circuit for which is shown in the figure below: