"**Sensitivity**",    "**Dynamic Range**"   and
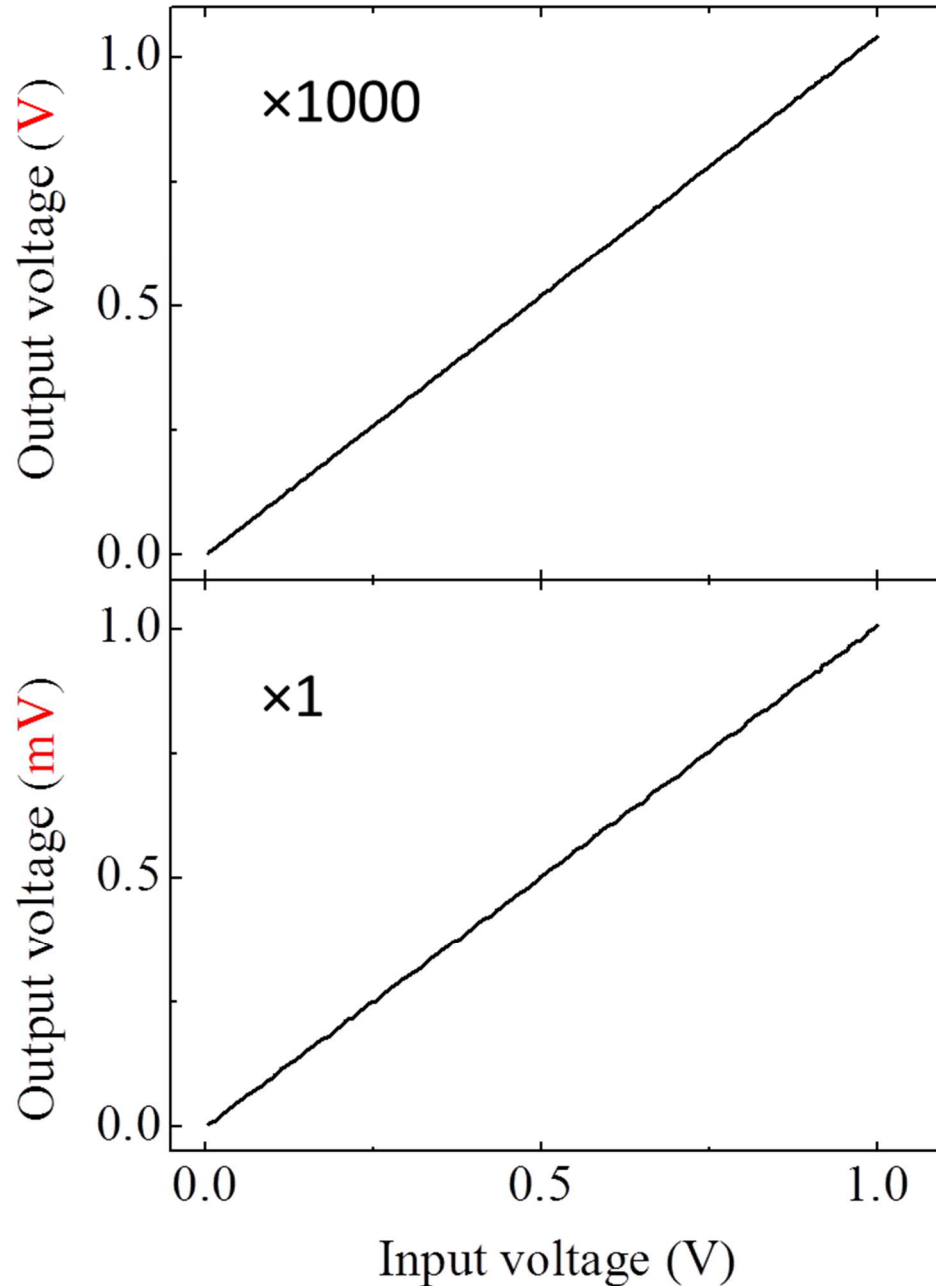
"**Bandwidth**"

# Sensitivity

Ratio of the change in an **indication** of a **measuring system** and the corresponding change in a **value** of a **quantity** being measured.

# Sensitivity (example)



Amplifier:

Gain = $\dfrac{\text{Output voltage}}{\text{Input voltage}}$ =

= Sensitivity

# Sensitivity (example)



**"SENSITIVITY"**
of a lock-in is in fact the upper limit of the **measurement range**.

# Dynamic Range

Ratio between the largest and smallest possible values of a changeable quantity. It is measured as a ratio or as a base -10 or -2.

<u>NOTE</u> for digital systems or devices, it is the ratio of maximum and minimum signal levels required to maintain a specified bit error ratio.

$$\text{Dynamic range} = \frac{\text{Measurement range}}{\text{Resolution}}$$

# Dynamic Range (example)

*Extech MN15*

*HP34401A multimeter*



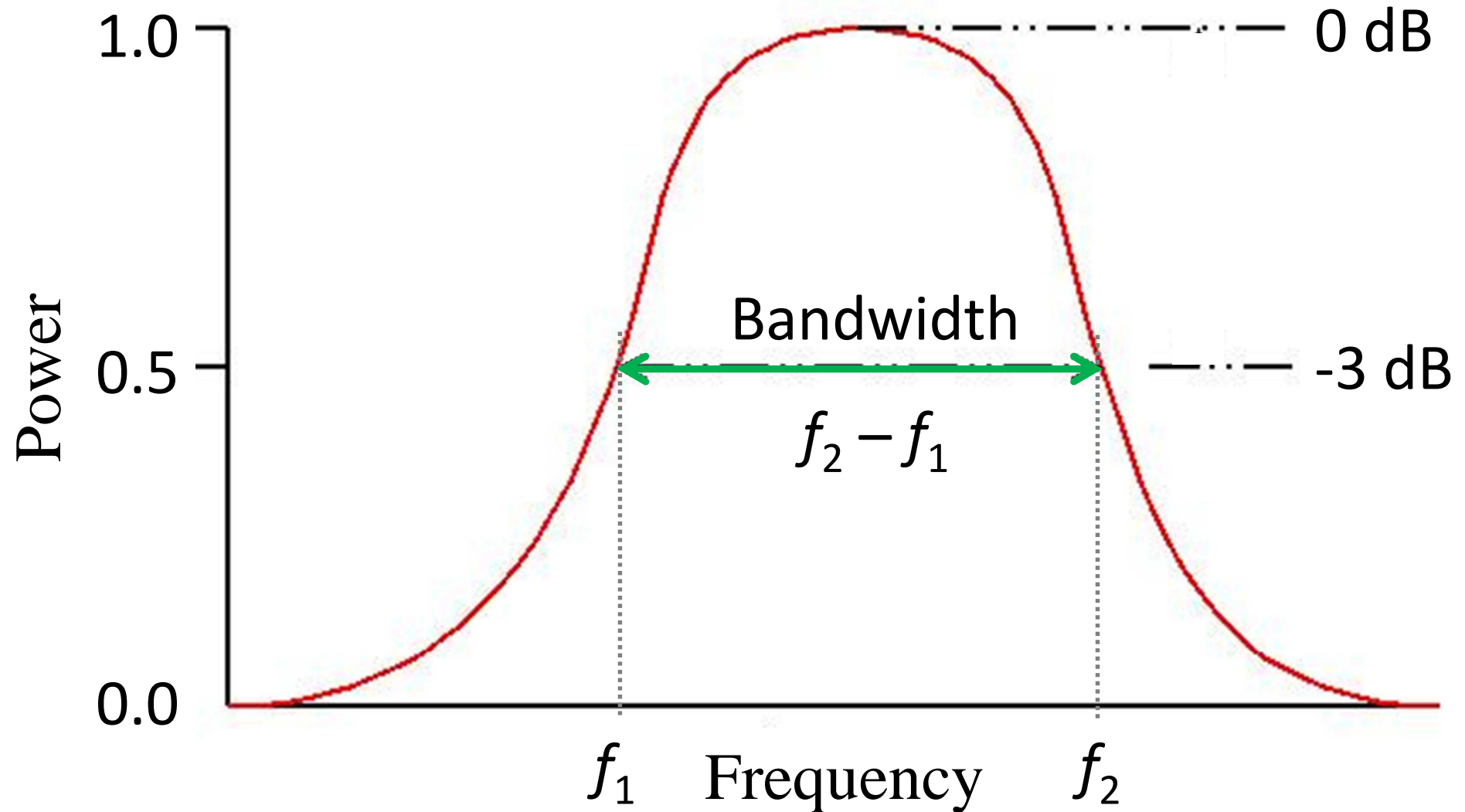$$DR = \frac{20\ M\Omega}{100\ m\Omega}$$

$$DR = \frac{100\ M\Omega}{0.1\ m\Omega}$$

# Bandwidth

difference between the upper and lower cut-off frequency of the frequency response function of a measuring instrument

# Bandwidth (example)

**Band-pass filter**

# Bandwidth (example)

**Low-pass filter**: $\tau = 100 \ \mu s \rightarrow f_c = \dfrac{1}{2\pi\tau} = 1.6 \ kHz$