This is a short introduction to make measurement oft he impedance of a speaker

What you need: Room Tools Dual FFT Analyzer
an external I/O device like the UA-25 connected to a MAC
a reference resistor e.g. 100 Ω or 1 k Ω

Make following arrangement:

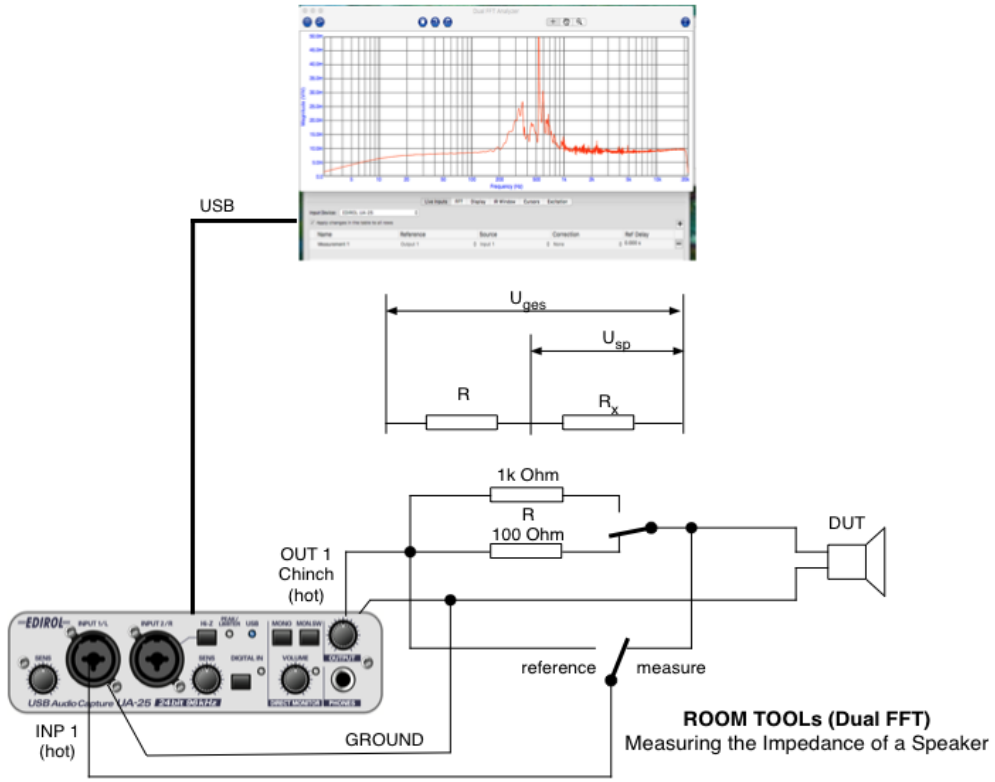

figure 1

Following settings should be applied:

(shown only the most important)

Live inputs:	Input device	UA-25
	Reference	Output 1
	Source Input	Input 1
	Corrections	none
	Ref Delay	0.000 s
FFT	Frequency span	22050.0 Hz
	Spectral Lines	8.820
	Digital Anti Aliasing	YES
Display	Function	Transfer Function (H1)
	Vertical scale type	Linear
	Horizontal scale type	logarithmic
	Vertical scale	50 m (for measuring the U_{ges})
	Vertical scale	10 m / 20 m (for measuring the U_{sp})

Excitation	Output Channel	Output 1
	Sweep type	logarithmic

How it's work:

$$I_{ges} = \frac{U_{ges}}{R + R_x}$$

$$I_{ges} = \frac{U_{sp}}{R_x}$$

$$R : R_x = (U_{ges} - U_{sp}) : U_{sp}$$

$$\frac{R}{R_x} = \frac{(U_{ges} - U_{sp})}{U_{sp}}$$

$$R = \left(\frac{(U_{ges} - U_{sp})}{U_{sp}} \right) R_x$$

$$\frac{R}{\left(\frac{(U_{ges} - U_{sp})}{U_{sp}} \right)} = R_x$$

$$\frac{R \cdot U_{sp}}{(U_{ges} - U_{sp})} = R_x$$

figure 2

Simply said, it's Ohm's law
First you measure the overall voltage U_{ges} – you see here also the frequency response of your device, see to *figure 3.*

Then you measure the voltage U_{sp} across your speaker (DUT)
see to *figure 4, 5 and 6.*

Then you calculate the Rx with the equation (figure 2) or you use the EXCEL calc sheet <Calc_Impedance.xlsx> (Please note that the decimal point "." is in AT a ",").

The result shows the impedance in Ω (Ohm)

The only tricky thing is to figure out the U_{sp} of the measured valued because as you see in the diagram figure 4 to 6 it's not a straight line but has dip's and peak's.
Best explanation which value you should take is given in EN 60268-5 "Impedance"
The lowest value of the modulus of the impedance in the rated frequency range shall be not less than 80 % of the rated impedance. If the impedance at any frequency outside this range (including d.c.) is less than this value, this shall be stated in the specifications.

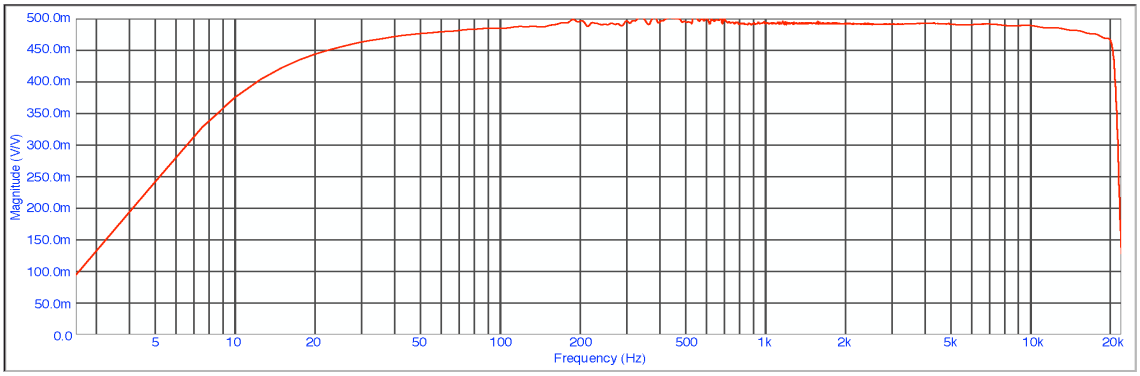

figure 3 (measuring the reference U_{ges})

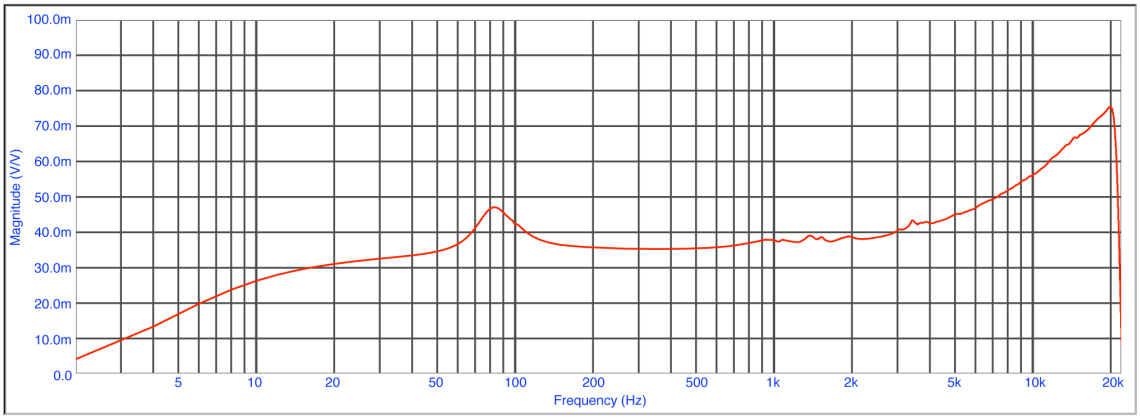

figure 4 (measurement of a DEL-180F, reference R = 100 Ω)

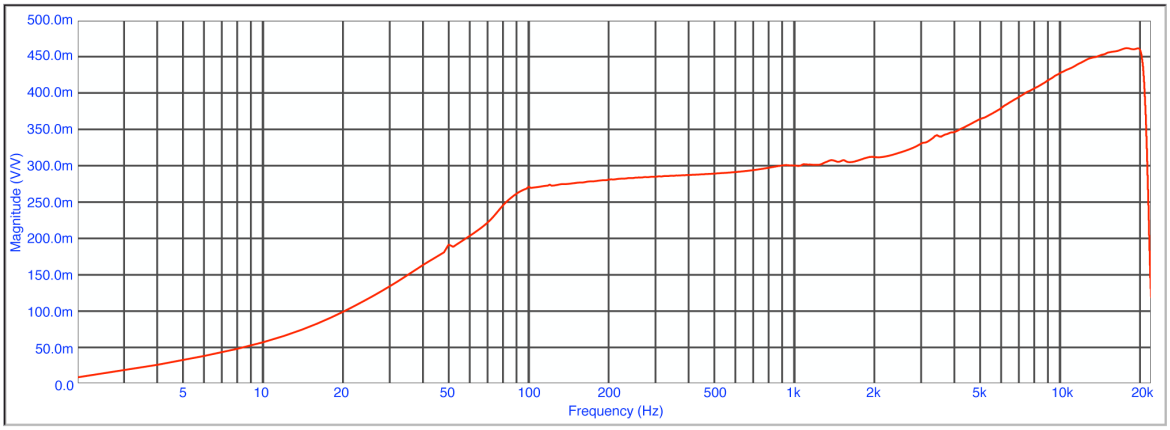

figure 5 (measurement of a DEL-180F-T 100 V, reference R = 1 k Ω)

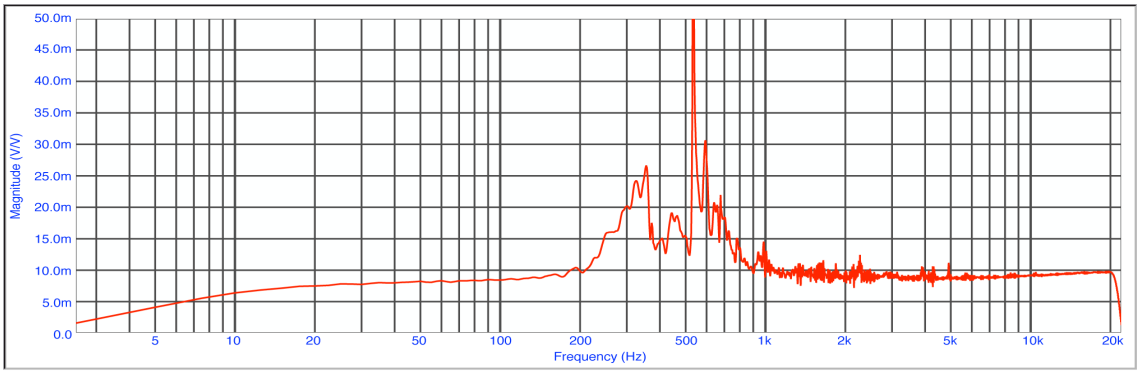

figure 6 (measurement of a damaged JBL tweeter, reference R = 100 Ω)