USB measurement microphone ATD4-S

With this USB measurement microphone you easily perform high performance measurements with your PC. Simply connect this microphone to a free USB port, no preamplifier, no external power no driver. It was never easier to measure with your PC.
This system uses capsules with the thread 60UNS. You can connect almost any pre-polarized capsule (class 1 or 2) from world leading brands. e.g. Bruel&Kjaer, GRAS, MTG, PCB and others. Capsules with 200V polarization voltage are **not** supported.

With common mechanical adapters you can use 1" or 1/4" capsules.

The base package is equipped with a class 2 capsule (23mV/Pa)

1.1 Features

- Gain is controlled by the PC allowing absolute level calibrations
- Requires no external power. Simply connect it to USB
- The operating system recognizes this USB microphone directly. There is no driver required. You can use this USB measurement microphone with Windows, MacOS or Linux. This feature will protect your investment, since you not depend on updated drivers.
- Special discrete microphone preamplifier optimized for lowest noise
- The microphone has 2 channels. Channel 1 is low sensitivity, while channel 2 is high sensitivity. This feature is optional.

1.2 Common characteristics

- Frequency range 5Hz-20kHz
- Sample rates 44.1 & 48kHz
- Sigma-Delta ADC with 16 bit
- Dual channel conversion with dynamic >120dB, which is better than any 24-bit converter
- Thread 60UNS
- USB Audio class 1.1 compliant
- possible cable lengths: 5m with simple passive USB cables, 15m with active cables and 60m with special transceivers for regular CAT5 cables
- Dimensions: length 180mm, diameter body 21mm head 13,1mm

1.3 Architecture

The units consists of:

1. capsule
2. FET behind the capsule as impedance converter
3. low noise discrete preamp
4. USB Audio interface chip with:
   -analog gain
   -ADC 16 bit
   -USB Transceiver

1.4 Software interface

This USB microphone is USB audio class 1.1 compliant. You can use the regular audio API of the operating system to access the audio date and to control the mixer.

- For Windows, Linux, MAC OS, iPad no drivers are required.
- For Android platforms (due to lack of USB audio support) you will need a special driver. For details:

http://www.winaudiomls.de/joomla/index.php/en/shop/product/view/15/127

1.5 Measurement results

Setup: measurement is done electrically with a replacement capsule of 22pF.
Signal sine with 1kHz
Samplerate 48kHz
THD<5%
Reference level: 0dB=50mV
All voltages are measured with **RMS**, unless otherwise noted.

Gain-Mixer 1%

	Low sense	Hi Sense
Level offset (50mV)	0dB	+26.7dB
Max Input level	1300mV	120mV
Equivalent input noise	31.4dBA 37.3dBZ	8dBA 19.5dBZ
Dynamic	99.7dBA 96dBZ	100.5dBA 95dBZ
Low cut frequency (-3dB)	5Hz	8Hz
Hi cut frequency (-3dB)	22.7kHz	22.7kHz

Gain-Mixer 3%

	Low sense	Hi Sense
Level offset (50mV)	0dB	+26.7dB
Max Input level	1200mV	120mV
Equivalent input noise	31.7dBA 37.8dBZ	8.2dBA 19.5dBZ
Dynamic	99.5dBA 93dBZ	96dBA 84dBZ

Gain-Mixer 10%

	Low sense	Hi Sense
Level offset (10mV)	0dB	+27.5dB
Max Input level	520mV	22mV
Equivalent input noise	23dBA 28dBZ	6.2dBA 19dBZ
Dynamic	88dBA 86dBZ	78dBA 66dBZ

Gain-Mixer 20%

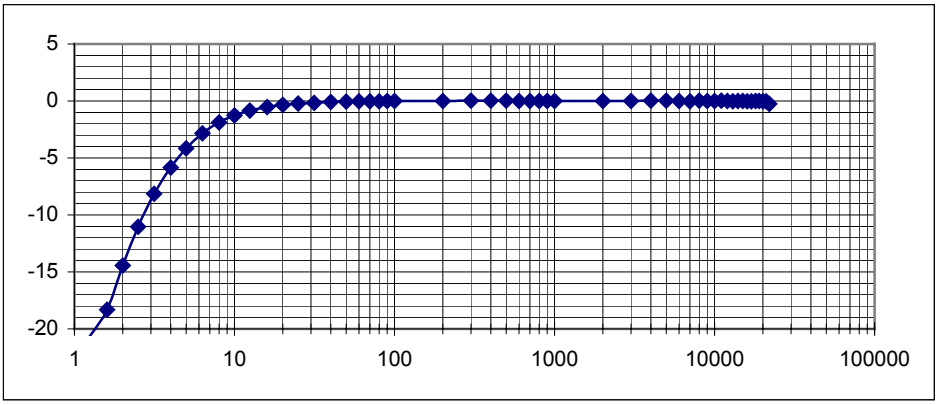
	Low sense	Hi Sense
Level offset (5mV)	0dB	+27.1dB
Max Input level	150mV	7mV
Equivalent input noise	22dBA 27dBZ	6.3dBA 19.5dBZ
Dynamic	84dBA 78dBZ	73dBA 60dBZ

Gain-Mixer 90%

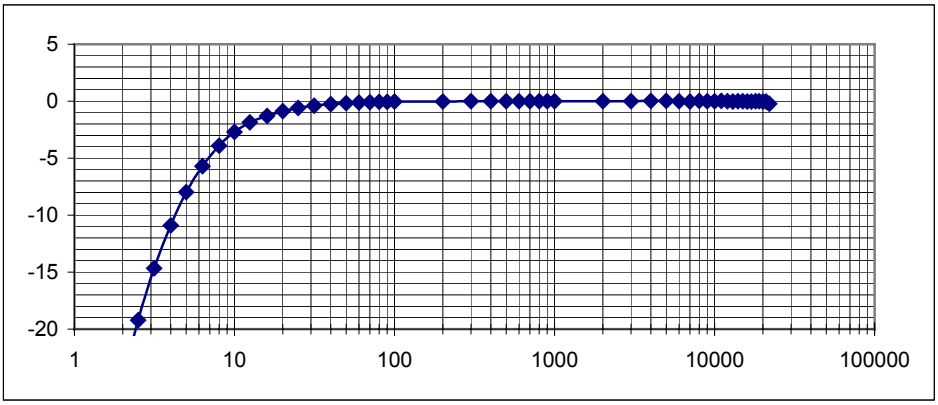
	Low sense
Max Input level	30mV
Equivalent input noise	22dBA 27dBZ
Dynamic	71dBA 66 dBZ

1.5.1 Frequency response of the amplifier and USB Interface

Frequency response low sense input 50mV

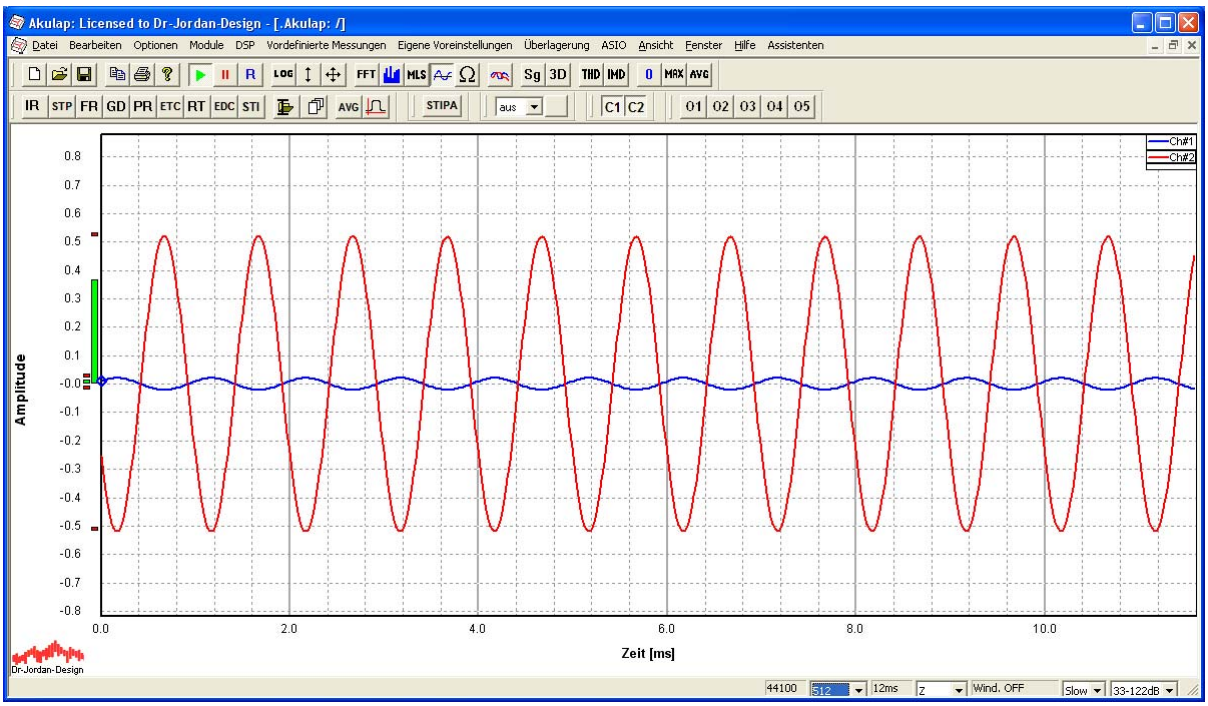


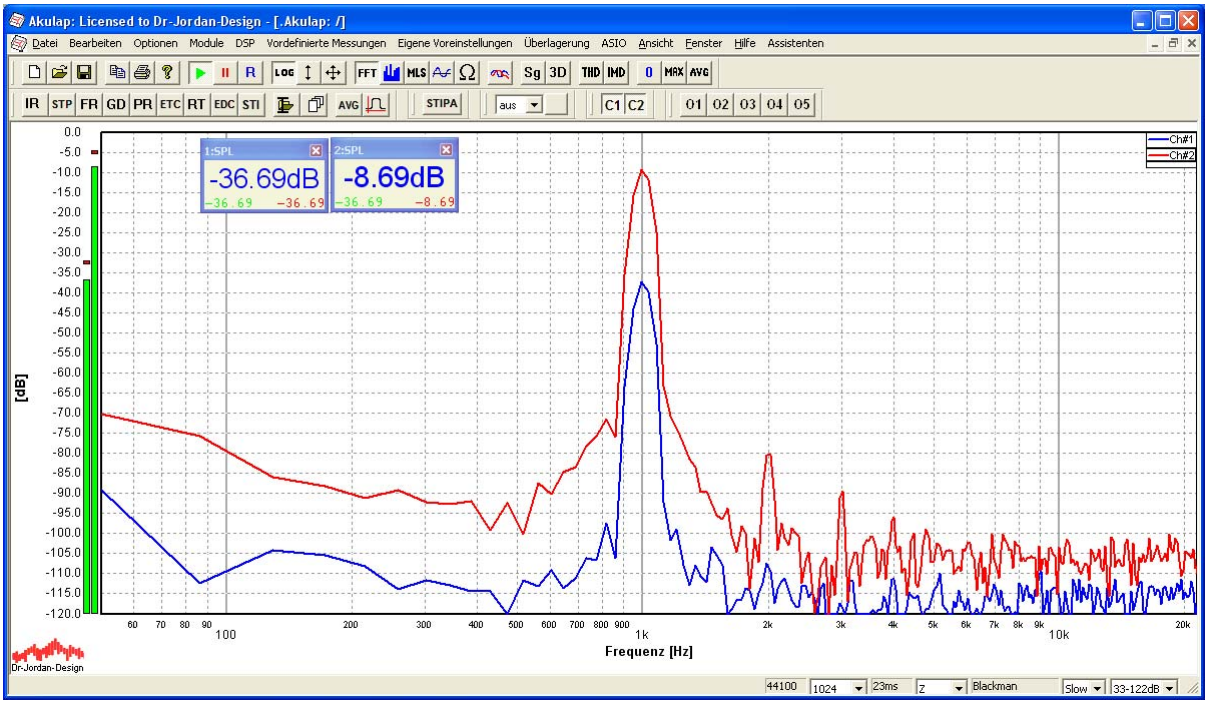
Frequency response Hi sense input 50mV



1.5.2 Channel offset

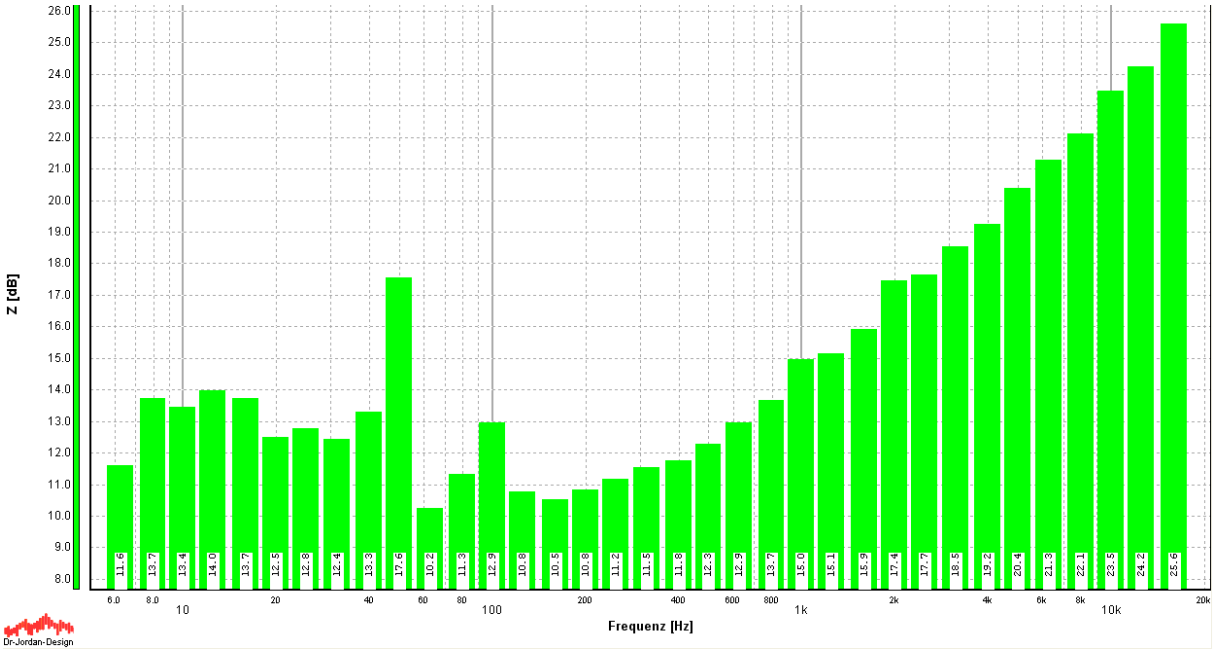
Input: 10mVRMS sine 1kHz with replacement capsule
Audio Mixer 10%
No scaling for both channels



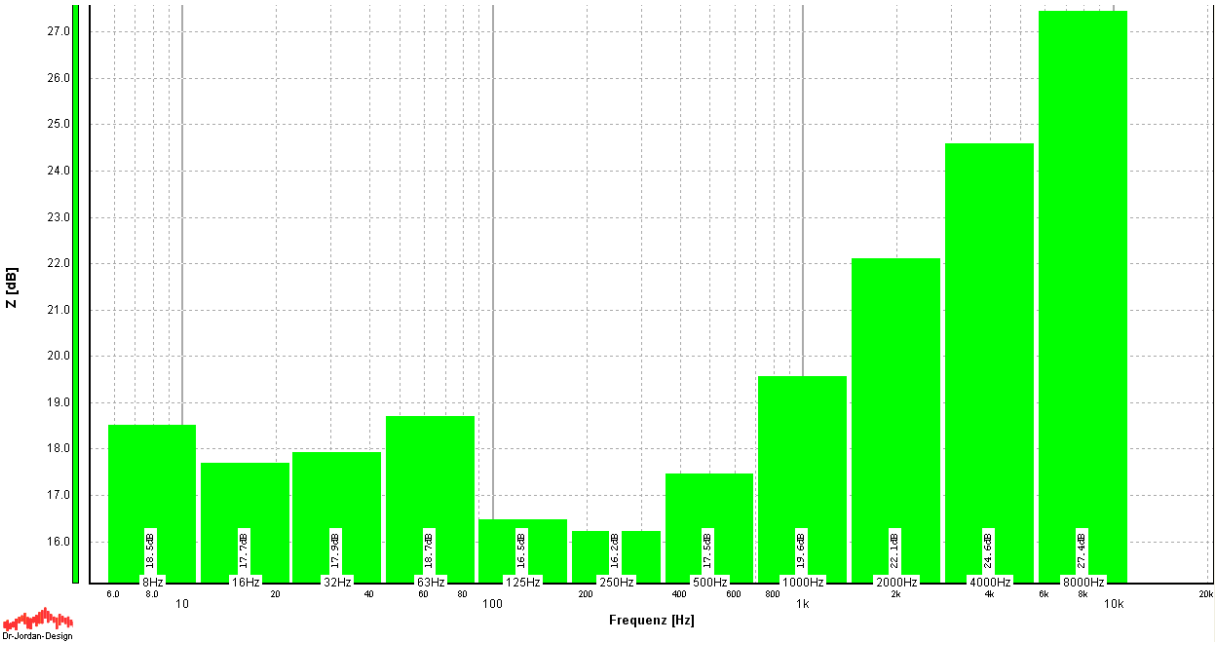


1.5.3 Electrical noise with replacement capsule

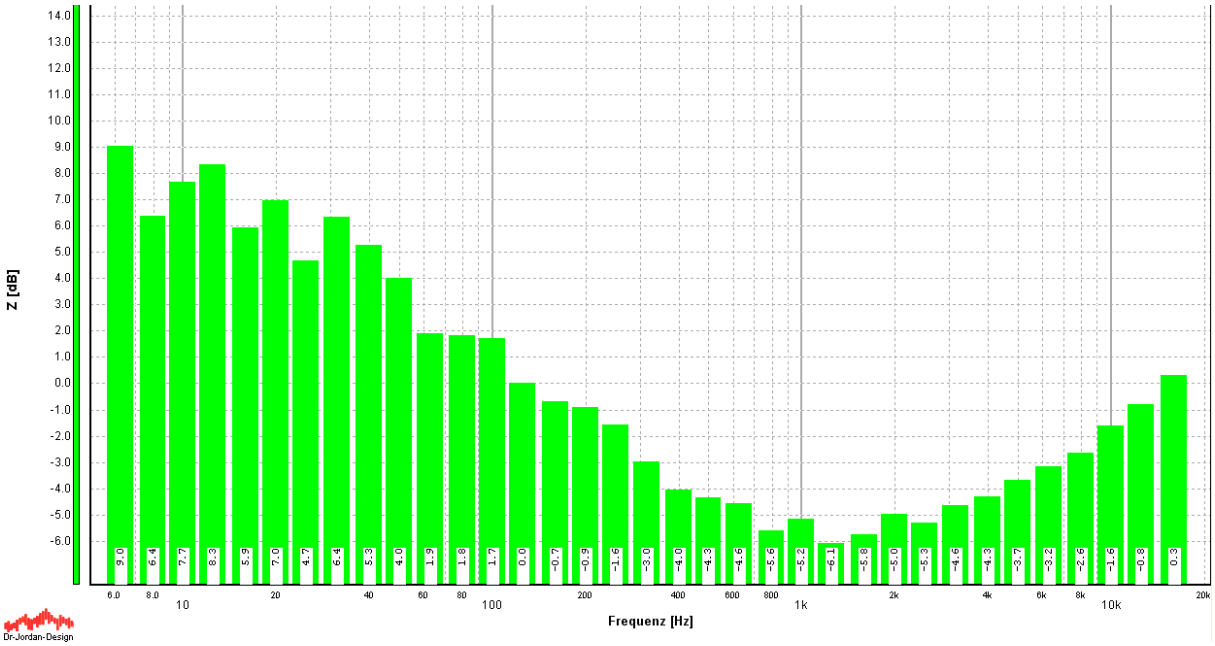
Input noise **low** sense 1/3 octave



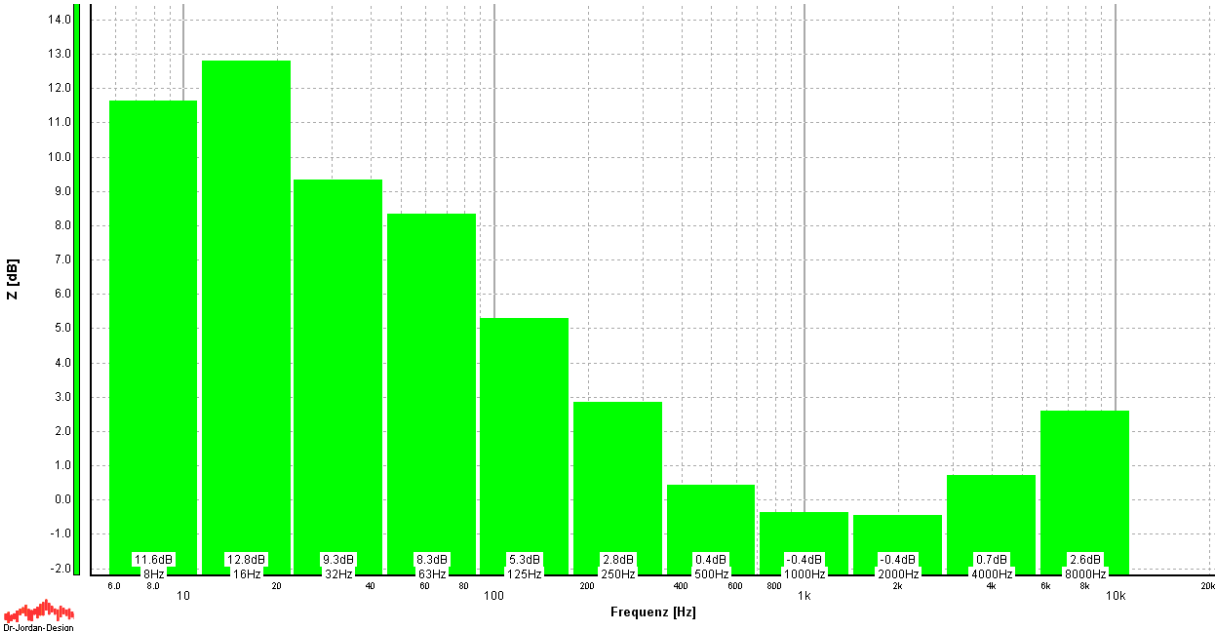
Input noise **low** sense 1/1 octave



Input noise **Hi** sense 1/3 octave



Input noise **Hi** sense 1/1 octave

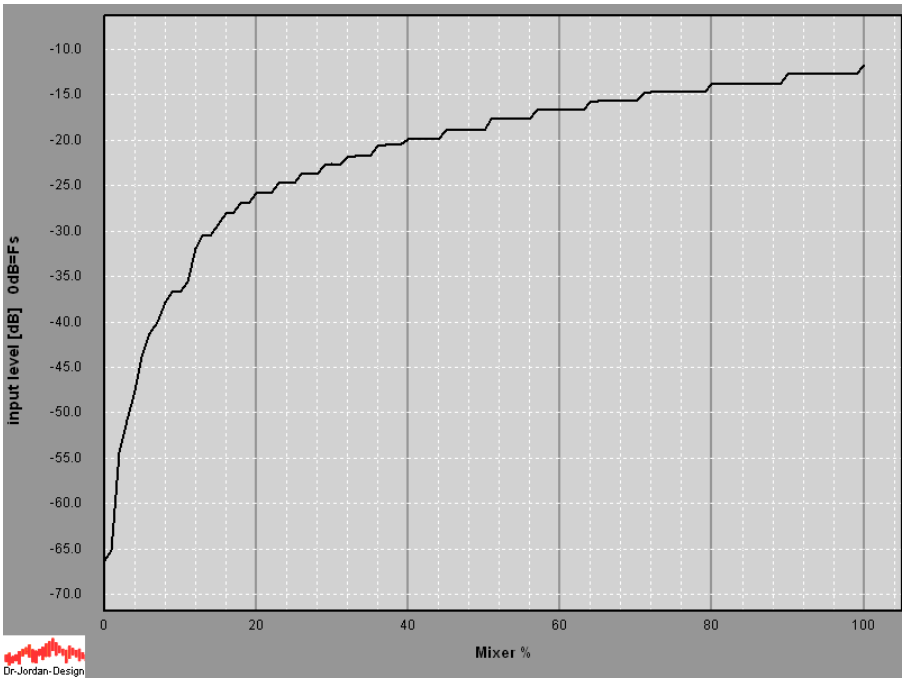


1.5.4 Internal gain settings (mixer)

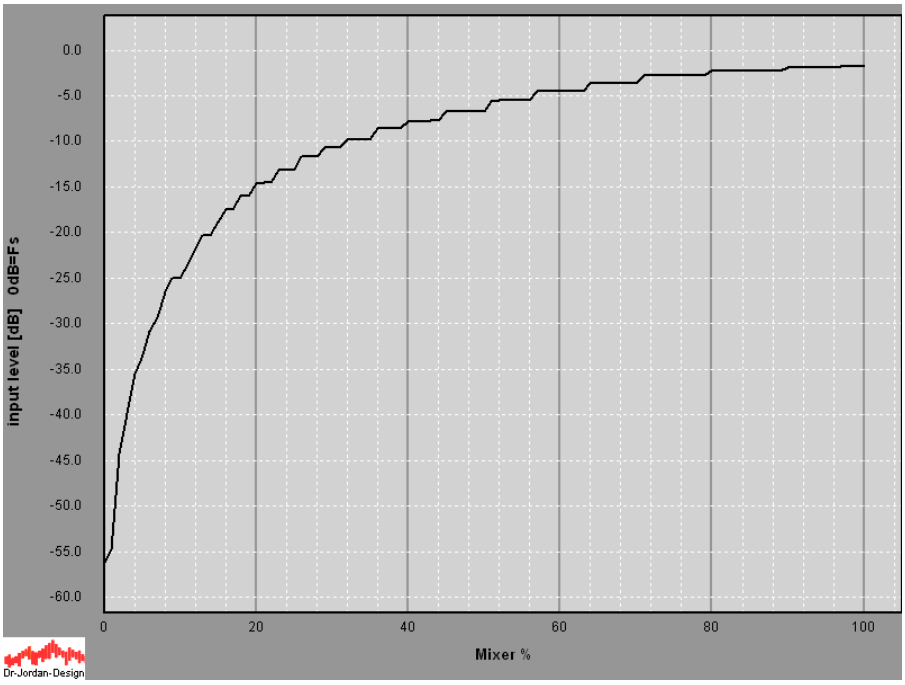
The unit has an integrated and programmable gain control. You can set it from 0% to 100% individually for each channel.

The useful range has a dynamic of 50dB.

Mixer curve (Windows XP Input 10mV) Low sense



Mixercurve (Windows XP Input 2mV) Hi sense



1.6 Maximum input level

The maximum input level is limited by the maximum voltage of the pre-amplifier. It has a limit of 1.200mV RMS by the first-stage FET.

This is a list for typical maximum linear levels with common capsules.

Capsule sensitivity [mV/Pa]	max SPL RMS [dB]	max SPL peak [dB]
2,5	147,6	150,6
5	141,6	144,6
10	135,6	138,6
20	129,6	132,6
25	127,6	130,6
30	126,0	129,0
50	121,6	124,6

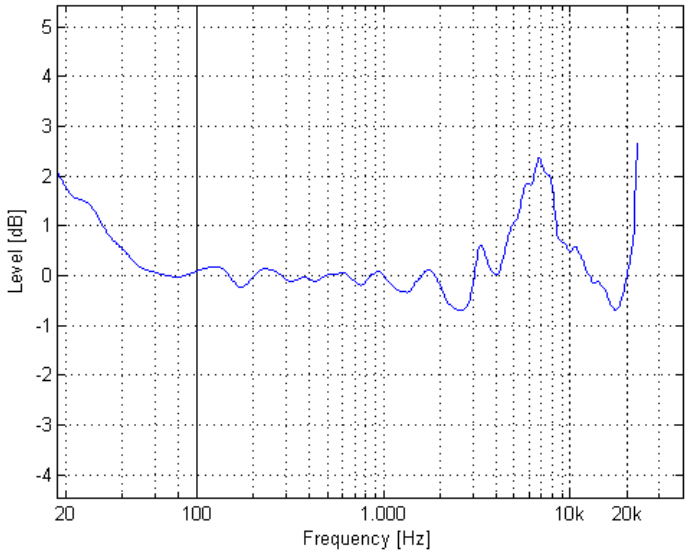
For high SPL measurements you can either use a low sensitivity ¼” capsule with adapter (top microphone) or an attenuator between capsule and pre-amplifier (middle microphone) or even a combination of both. The bottom microphone in the picture below is just for reference.

1.7 Microphone capsules class 2

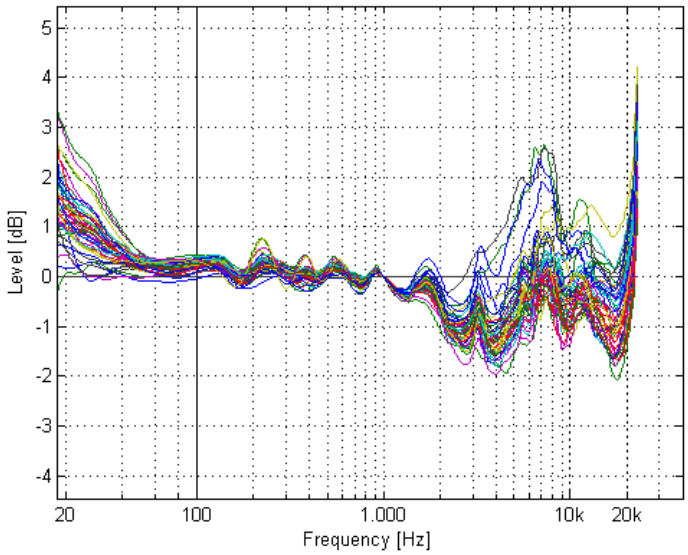
The included class 2 capsule has a typical sensitivity of 23mV/Pa. It can be upgraded to class 1 capsules.

The acoustical noise floor is below 18dB(A).

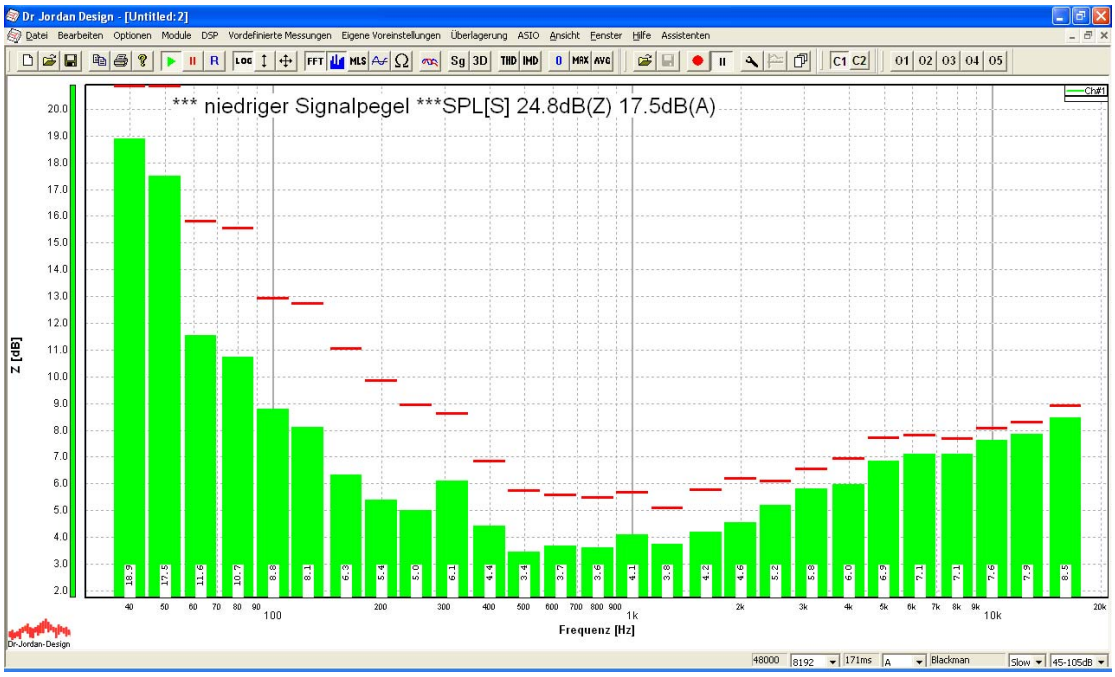
Class 2 capsule typical free-field frequency response (relative level in dB)



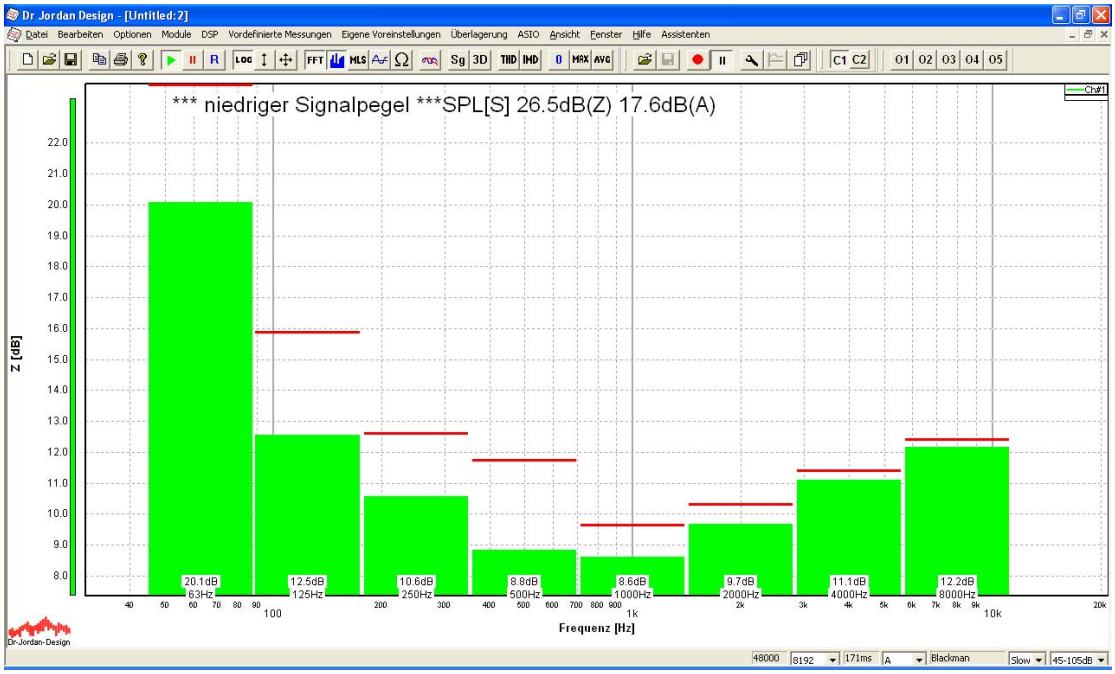
Class 2 statistic of 50 units (relative level in dB)



acoustical noise floor 1/3 octave



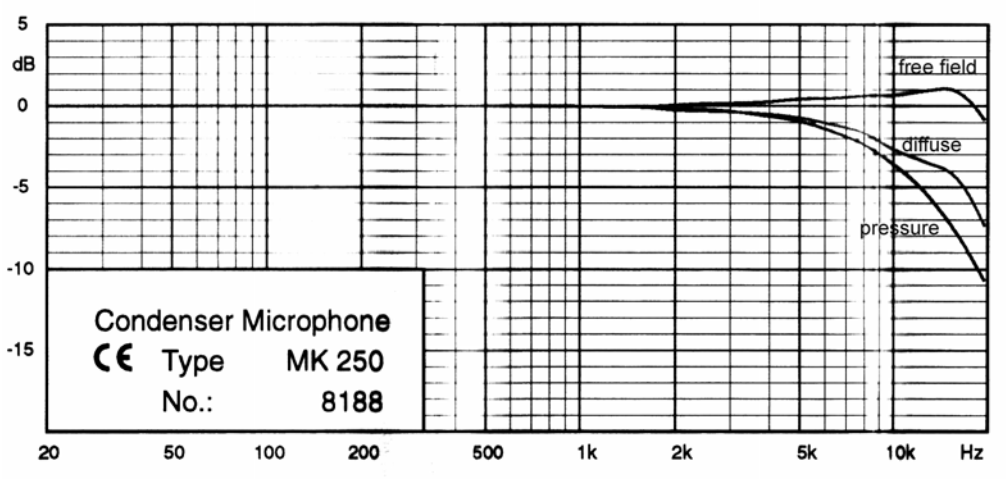
acoustical noise floor 1/1 octave



1.8 Microphone capsules class 1

Since you can connect almost any pre-polarized class 1 capsules with thread 60UNS, we can give some generic information, only.

Frequency response of a MTG MK250 capsule.



The acoustical noise floor is below 16dB(A) (1/2” 50mV/Pa).