

digital audio measuring equipment

Digital Audio Analysis System

DAAS[®]4USB

for Windows[®]

*2 Channel Audio FFT-Analyzer with USB – Interface
for mobile use*

Digital Audio Analysis System DAAS[®]4USB

DAAS[®]4USB is a PC-based, mobile measurement system in the field of electro-acoustical and electrical measurements. The field of this equipment covers the measurement of frequency responses as well as impedance responses, Thiele-Small parameters or distortion measurements. DAAS[®]4USB is a two-channel system with an dedicated front-end which includes all necessary components like microphone preamplifier, power amplifier and a software controlled relay switch-bank. The signal data interface between the PC (notebook) is the USB. To carry out measurements one needs only the DAAS[®]4USB plus microphone and a PC or notebook. The easy use of our system family retained. All important parameters are optimally set for each measurement. For the user who wishes to delve deeper into the system, the possibility exists to change the systems various parameters.

General view of the DAAS4USB functions

- Runs with Windows-XP (since SP2)
- Interface via USB
- Measurements of frequency and impedance response curves with var. frequency resolution down to 0.1 Hz
- Free field correction of acoustic frequency response curves
- Calculation of phase from frequency response curves with automatic delay correction for acoustical measurements
- Waterfall spectrum (cumulative spectral delay)
- Minimum phase, excess phase and propagation time
- Display of step response, impulse response and ETC (energy time curve)
- Thiele-Small parameters measured with special sine sweep
- Distortion measurement of virtually any frequency in the systems range
- Intermodulation and difference tone distortion with variable frequencies
- Distortion curves vs. frequency or level
- Data export to speaker CAD, (LspCad, AkAbak[®], Leap, Audiocad...etc.)
- Reverberation time analysis (RT60)
- Level meter in acc. to IEC651, L_m and L_{TM3/5} weighting filters A, B&C
- Speech intelligibility measurements RASTI & STI-PA
- Frequency response measurement of phono preamps by inv. RIAA curve
- Oscilloscope function
- Spectrum analyzer function with various analysis options
- Frequency response measurement with live signals (“on stage” meas.)
- support of max. 99 microphones including their correction data files

The DAAS4USB front-end

A real benefit: no more annoying connecting and disconnecting of the measurement wiring – the front-end is conditioned by the software via the interface, depending of the current measurement.



The front-end of the new DAAS4USB is very similar to the DAAS4Pro front-end – this makes changing between the DAAS systems very easy! Above shown is the version with optional microphone input with LEMO-connector for condenser microphones with 200Volts polarization voltage, available on request.

Basic-functions of the DAAS4USB:**Frequency response measurements**

DAAS4USB allows frequency response measurements with different sample rates, using various noise - or sine signals by comparison to a calibration measuring, acoustical or electrical likewise with FFT-resolutions from 4096 ... 65545 points. The user gets the following combinations:

Reference measure:	Measure (DUT):	Example:
1.electrical	acoustical	Speaker measurements
2.electrical	electrical	Amplifier measurements
3.acoustical	Electrical	e.g. microphones
4.acoustical	Acoustical	e.g. acoust. comparisons

Sub functions of frequency response measurements:

- 1. Phase response.** Zoom function from *3deg ... 270deg/Div.* including display of minimum-phase response and excess-phase response. Switch for phase wrapping on/off.
- 2. Free field correction.** Time window adjustable from *0,1ms ... 64ms/Div.*, max. time of 703ms denotable.
- 3. Step response display.** Zoom from *0,1ms ... 64ms/Div.* , max. time of 703ms denotable, additional is a ETC (Energy Time curve) selectable.
- 4. Waterfall (CSD).** from *0,5ms ... 1024 ms* , $f_{\min.} = 200\text{Hz}$, numbers of spectra: 48, 60 & 72. Also available with free field simulation.
- 5. Group delay time, display range $\pm 0,25\text{ms} ... \pm 8\text{ms}$.** Maximum resolution is 0,04ms/Div. Also available with free field simulation.
- 6. Smoothing of frequency response curve.** Avail. octave/0.8, oct./1.5, oct/3, oct./6, oct/12 etc. up to octave/48, depending on chosen FFT-length.

Additional information on frequency response measurements:

- **vertical display range:** *5 dB to 120 dB*, max. resolution. *0.5dB/Div*, free panning
- **frequency axis range** *5Hz .. 2500Hz, 13Hz ... 20KHz*, spreadable
- **Units:** dBV, dBm[electrical], dBPa/V, dBSPL/V, dBSPL/W/m [acoustical]
- **Frequency range** *5Hz up to 20KHz*, max. zoom is 1 octave of full scale
- **additional calculation** of slope steepness of frequency response curves
- **Correction of signal propagation time** [acoustical], automatic or manual
- **Signal export** in ASCII, for LspCad, AkAbak[®], Leap, Audiocad, Calsod etc.
- **Polar diagram** for frequency response measurement

Impedance response measurement

Impedance measurements can be done in a frequency range from 5 Hz up to 20KHz with different sample rates (6KHz, 48KHz). Stimulus is a special sine sweep signal. Display range: $1,6 \Omega$ 6400Ω max., resolution $0,2 \Omega / \text{Div}$. Additional display of phase response. An impedance response can be displayed in a frequency response diagram. Proceed: constant current method only.

Distortion measurements

Distortion measurements, electrical and acoustical likewise. FFT lengths from 4096 up to 16384 points, max. time averagings: 64.

1. Distortion, displayed k2... k9 and THD, incl. distortion spectrum. Internal signal frequencies from 20Hz ... 10KHz

2. Distortion curve. displayed k2...k7 and THD, from 20Hz ... 10KHz (with internal signal source only) with a maximum of 252 frequency steps.

3. Intermodulation measurement. f_1 selectable from 100Hz ... 2KHz . f_2 selectable from 800Hz ... 8KHz . Possible amplitude ratio $f_1 / f_2 = 1:4, 1:2, 1:1$ Displayed are m2 [quadratic] und m3 [cubical] (with internal signal source only)

4. Difference tone distortion. Two signals with a distance of 70Hz ... 999Hz in a frequency range between 5KHz ... $15,9\text{KHz}$. Displayed are d2 und d3 (with internal signal source only)

5. Distortion as a function of signal level

Distortion vs. voltage [V], or power [W] The referred load resistance is variable from 2...32 Ohms. Displayed are k2...k7 and THD.

Speaker parameter measurement - Thiele-Small parameters (TSP)

The full range of TSP, determined on a speakers impedance measurement using a special sine-sweep signal as stimulus. Calculation of speaker equivalent volume (V_{AS}). Two methods are available: fasten a defined weight on a speakers' dustcap (delta-mass method) or measurement in an enclosed volume in acc. to Carrion-Isbert (closed box method).

Special functions

Frequency response curve combination

This function makes it possible to combine a frequency response measurement made in the near field (e.g. direct in front of the woofer) with one in the far field. The result is a complete curve from 20Hz up to 20KHz without the room influence in the low frequency area.

Waterfall, with stimulus sine burst

A special method using sine burst signals as stimulus instead of noise signals, the time axis is displayed in cycle duration. The utilization is speaker chassis construction or cabinet construction. One can grasp at a glance an energy storage, e.g. build from parts of the speaker cabinet.

Reverberation time (RT) measurement RT60

Stimulus is a narrow-bandwidth noise from 63Hz...8KHz at octave interval. After switching-off the stimulus the room echoes are evaluated and the RT is displayed. The results can be exported in a chart format.

STI-PA und RASTI This speech intelligibility measurements can be done with internal or external sources (from CD, can be ordered optional).

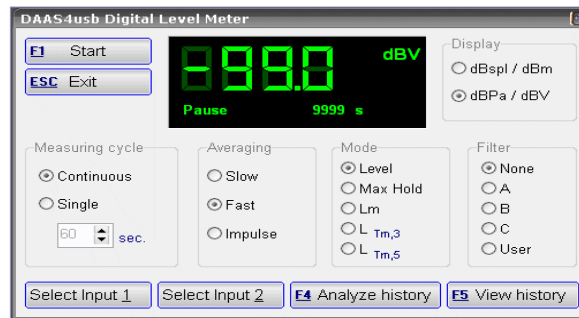
Spectral analysis. electr. & acoust., display range from *5dB... 110dB*, max. resolution *0,5dB/Div*. FFT – length *512... 65535 Pt*. FFT – windows: Rectangular, Hanning, Blackman, Kaiser, Flat Top.

Additional functions: smoothing, averaging with exponential or linear weighting. Modes: continuous running (free run mode), single shot with cursor readout. Two frequency ranges are available: 12Hz... 2,5KHz, 100Hz...20KHz. Vertical units: dBV, [electr.] and dB SPL, dB SPL(A), Sone [acoust.] All internal signals are available with the tracking generator function.

Storage-oscilloscope. electr. & acoust., time range from *11ms ...1398s*. Zoom function in the time domain up to *0,06ms/Div*.

Additional functions: cursor - readout, display of: true RMS value, extrema, crest factor. Modes: free run mode, Single shot, spectral analysis with the following window functions: Rectangular, Hanning, Blackman, Kaiser, Flat Top.

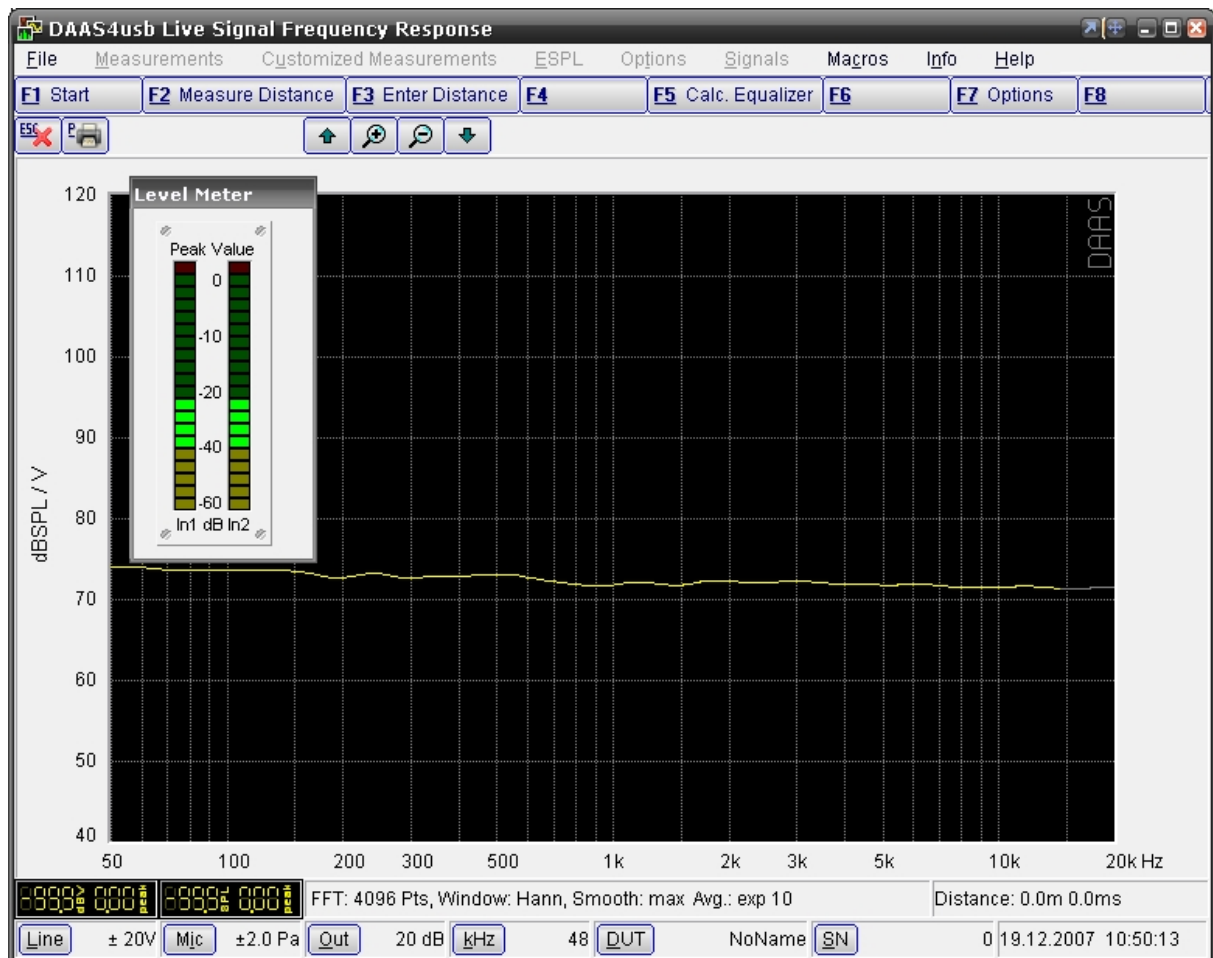
Level meter. A true RMS millivolt meter with units dBV, dBPa, dB SPL, dBm. Data display in free run modus or controlled by a defined meas. time. Averagings: (impulse/fast/slow in acc. to IEC651. Max. resolution: *0.1dB*. Additional functions: peak hold and functions for acoustical noise level measurements (L_m , L_{TM3} , L_{TM5}) Weighting filters A, B and C.



Microphone linearization file

Mic. Linearization data are stored in ASCII-format and are user configurable. Up to 99 different microphone data can be stored.

DAAS-life-signal-frequency-response measurement



The life-signal-frequency-response measurement software was developed to measure frequency responses in nearly real time with music signals instead of noise -or sweep signals. The LSFR software allows measuring frequency responses „on stage“, with running music material. So all kinds of public address systems (PA) can be adjusted easily.

Another field is the setup of sophisticated home-hifi speakers., e.g. electrostatic speakers or divided speaker systems / networks. So one can find the best position for his speakers in a listening room. Nearly any periodic broadband stimulus as measuring signal is usable - but for human ears music is most convenient. Who wants to hear noise or sweep signals during a concert?

Measuring signals, printers, system requirements

Internal measuring signals. DAAS4USB makes a lot of user selectable signals available, e.g. for transfer function measurements: periodic noise signals with FFT – lengths from 2048, up to 65535 points, all generated with inverse FFT function. For impedance measurement and Thiele-Small parameters a highly optimized symmetric sine-sweep is provided.

Printers. All printers with current Windows drivers are supported. Additional function: screen-export to BMP or JPG file. Inscriptions can be done directly in the displayed measurement screen.

System requirements. Computer: AT-compatible PC or notebook with one USB connector (USB1.1 or 2.0) **and** one serial interface connector (RS232), or a second USB connector with suitable USB-to-RS232 adapter. CPU min. 1,6GHz, main memory min. 512 MB RAM. Software: Windows[®] 2000 since SP4 or XP since SP2

Technical Data DAAS4USB

Inputs:

Electrical input:

BNC - input (Line-asymmetrical): $\pm 0.20V_s, \pm 2.0V_s, \pm 20V_s, \pm 200V_s$
(via software switchable)
Input impedance 100 KOhm.

Microphone pre-amplifier

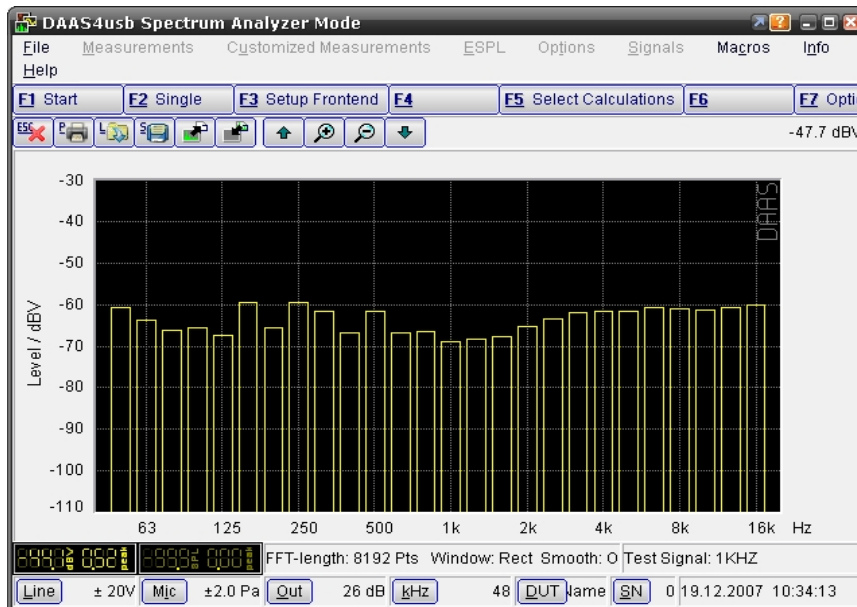
XLR – 3pin. connector, symmetr. / asymmetr.
Input impedance symm. 5,4KOhm (XLR Pin2 to Pin3)
Input impedance asymm. 51KOhm (XLR Pin2 to Pin1+3)
Frequency range (-3dB) 5Hz ... 70KHz
Amplification factor (adjustable) max. 20dB

Sample rates: 48KHz, 6KHz

2 input sensitivities switchable via software,
Selectable transmission factor for microphones (unit: mV/Pa)
Adjustable microphone-socket-base (full scale level for microphone input)
Calibration of all inputs is possible.

Power amplifier

Output power :	max. 40W peak @ 4 Ohms
Max. distortion (at Pmax. -10%)	typ. 0.02 %
Max. distortion (at 10watts)	typ. 0.005 %
Frequency range (-3dB)	typ. 9Hz ... 100KHz
Amplification factor	30,2dB ± 3% at 1KHz



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System delivery without microphones, please order microphones separately.

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