

# CLIO 14

Software

Turns your PC into the most complete easy-to-use electrical and acoustical measurement system ...



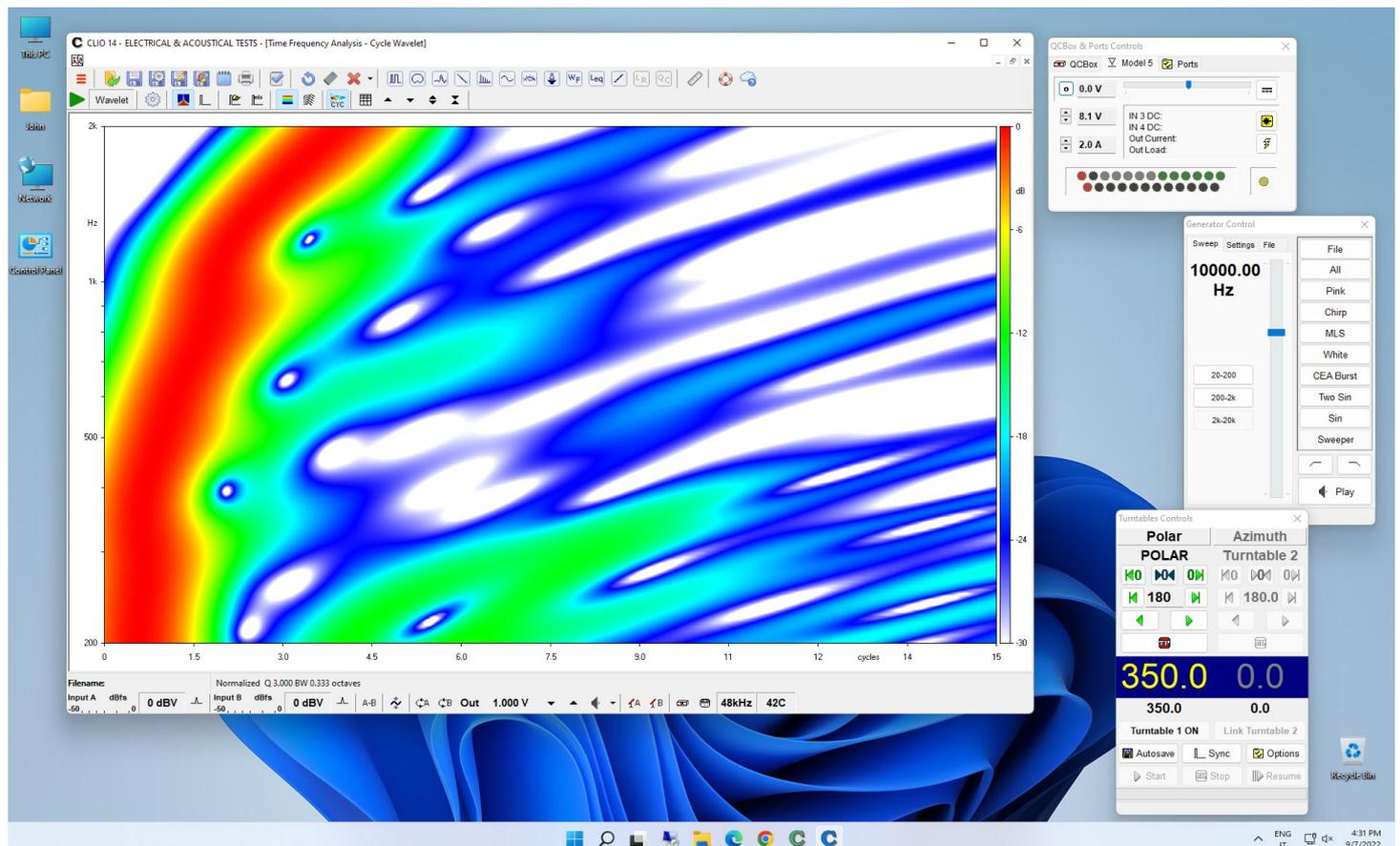
■ **CLIO 14**, by Audiomatica, is the new measurement software for the CLIO System. A **CLIO System** is composed by the CLIO software coupled to the proprietary Audiomatica **CLIO X USB Interface** (24bit @ 192kHz) in photo.

The **CLIO System** is capable of measuring:

- Electrical Networks
- Electronic Equipment
- Loudspeaker Systems
- Telephones & Hearing Aids
- Environmental Noise
- Rooms Acoustics
- Bluetooth and Smart Speakers
- Quality of Production Lines

**CLIO** runs with a standard PC computer; the power, precision and reliability of the resulting instrument is 100% warranted by Audiomatica, **no need for third party hardware**. **CLIO** is compliant with Windows Vista, 7, 8, 10 and 11; 32 and 64 bit support. **CLIO 14** has a brilliant fresh look allowing gesture controls while relying on an incredibly powerful design founded on the huge work which is the synthesis of more than 30 years of experience and excellence in electro-acoustic measurements. **CLIO 14** adds new exciting functionality:

- New THD+N vs frequency measurement
- New AES 75 loudspeaker maximum linear sound levels using noise
- New Dual Open Base turntable direct control



## ■ CLIO 14 MAIN SOFTWARE RELEASES AND VERSIONS

**CLIO 14 STANDARD:** Laboratory grade software with most of the features present.

**CLIO 14 QC:** Adds a **Quality Control Processor** for state-of-the-art testing and controlling a production line; also adds some particular lab applications like 3D measurement analysis.

## ■ CLIO MEASUREMENT TECHNIQUES

Compared to other measurement systems, **CLIO** concentrates the power of many different instruments into a single one.

Three different measurement techniques are available for system identification and characterization:

■ **MLS & LogChirp analysis** using either pseudo-random noise or logarithmic chirps as stimuli.

■ **Sinusoidal Sweeps** using sinusoidal signals.

■ **FFT, RTA & 'LIVE' Transfer Function** letting you the choice of any stimulus, even music.

■ While other instruments offer one single possible measurement choice, **CLIO** permits you to view the physical phenomenon like frequency response, impedance or other parameters, from different points of view. The final result will be then validated by the consistency of these measurements: as any expert technician knows, this is the correct approach that should always be adopted.

The following specialized control panels are dedicated to other **specific measurements**:

■ **Linearity and Distortion** measures the non linear behavior of an electronic equipment

■ **Sound Level Meter** a IEC61672 integrating sound level meter with Leq and frequency analysis

■ **Interactive L-C-R Bridge** permits passive components measurement on the fly

■ **Wow&Flutter Meter** with time and frequency analysis

■ **Frequency Counter**

Beyond measured results you get sophisticated **post-processing tools** for:

■ **Thiele&Small Parameters** for loudspeaker characterization

■ **ISO 3382 Acoustical Parameters, STI and STIPA** for rooms and auditoria characterization

■ **Directivity analysis** for loudspeaker as 2D Color maps, Circular or waterfall-like plots or 3-D Balloons analysis (only in QC version) for complete spatial characterization

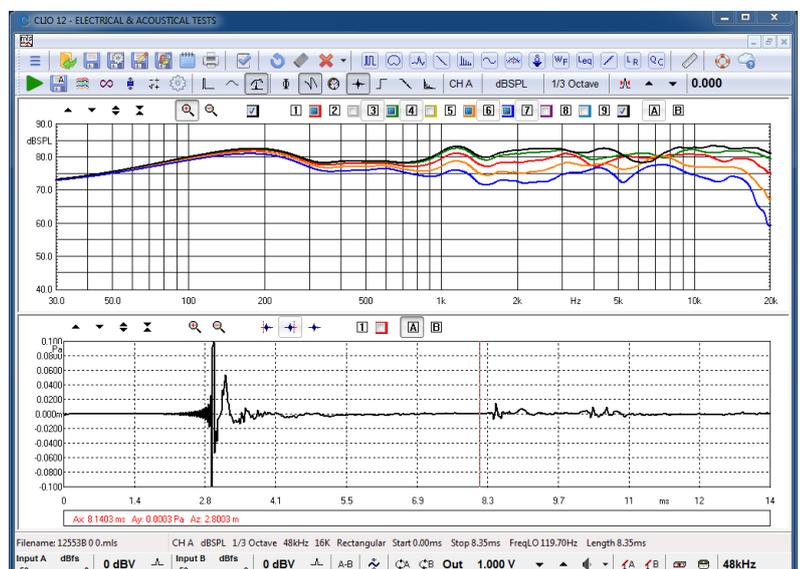
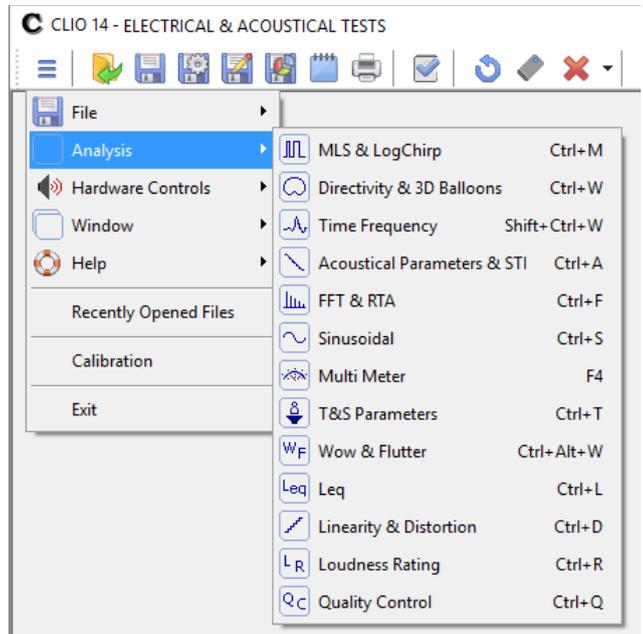
■ **Time-Frequency Analysis** to evaluate Cumulative Spectral Decays, Energy Time Frequency and Wavelet Analysis. Either as 3D plots or Color Maps.

■ **Loudness Rating Calculator** for assessing RLR, SLR and STMR (only in QC version)

■ **Quality Control.** Using all the aforementioned measuring and post-processing techniques it is possible to tailor powerful **Quality Control** scripts that will manage and identify any production line of electronic or electro-acoustic devices.

## ■ MLS & LOG CHIRP ANALYSIS

**CLIO** implements linear systems measurement with the well established MLS analysis technique now enriched by the possibility of using Logarithmic Chirps. The result is the system's **impulse response** measurement, by means of sophisticated algorithms; this lets you perform accurate anechoic analysis of loudspeakers and room acoustics evaluation. The measurement is highly accurate and extremely fast to execute; the data recorded by the computer, can be instantly analyzed or stored for later processing.



What MLS & LogChirp analysis gives you:

- Stimulus size up to 2MSamples.
- Joint Frequency & Impulse Response display
- Phase Response with Auto Delay Capture, Minimum and Excess phase calculation.
- Group Delay
- Impedance measurement
- Step response
- Energy-Time curve (ETC)
- Schroeder reverberant decay
- Selectable analysis window
- Manual or continuous time average
- Continuous measurement loop
- Mathematical operations on data
- Automatic near and far field merge
- Frequency smoothing (1/2 to 1/12 of oct)

### ■ SINUSOIDAL ANALYSIS

**CLIO** executes sinusoidal analysis with a digital filtering of input signal to achieve the highest noise-immunity; in this way you add the power of the PC to the most traditional frequency analysis. The sinusoidal technique is oriented to:

- Stereo sweep for simultaneous Frequency, THD, Rub&Buzz and Impedance response
- Phase response
- A/B channels difference response
- Continuous and stepped sweeps
- Sweep amplitude equalization vs. frequency
- Frequency resolution from 1/3 to 1/192 oct.
- 2nd to 10th harmonic + THD plot vs. frequency
- THD+N plot vs. frequency
- Fast-Track™ Rub&Buzz plot vs. frequency
- Gating system with auto-delay for quasi-anechoic measurements

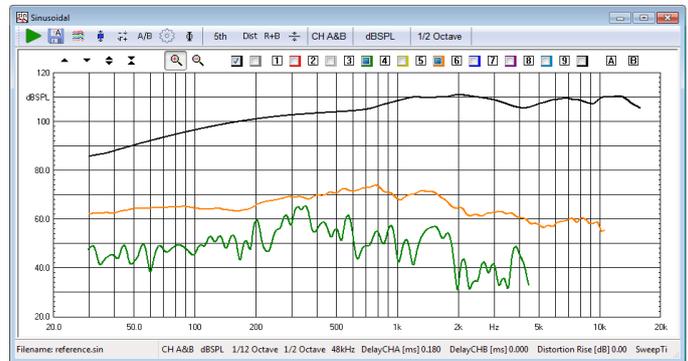
### ■ FFT, RTA & 'LIVE' TRANSFER FUNCTION

These measurements are implemented with an interactive control panel that permits the simultaneous display of time and frequency domains. Three operating modes:

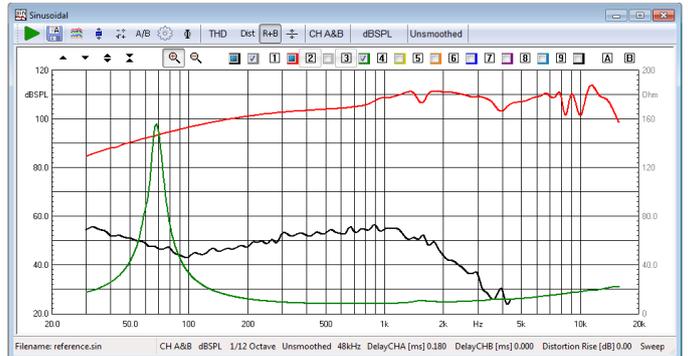
- Narrowband FFT
- Octave bands RTA
- 'LIVE' transfer function

The main features are:

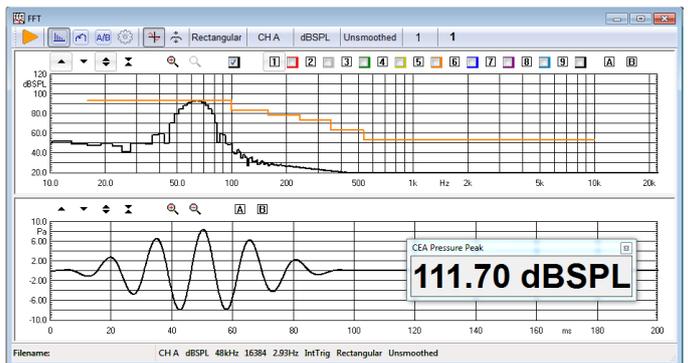
- Two channels measurement and display
  - Internal + Event trigger with delay
  - FFT from 512 points up to 256k points
  - Linear or exponential averaging
  - Max hold and min hold functions
  - Linear or logarithmic frequency axis
  - 1/1, 1/3 octave or 1/6 octave RTA display
  - Equal Loudness Contours display
  - Frequency smoothing
  - ANSI CEA-2010 & CTA-2034 Power Test
  - AES75 standard measurement with M-Noise
- It is possible to easily execute bursted distortion measurements delivering, for a definable short



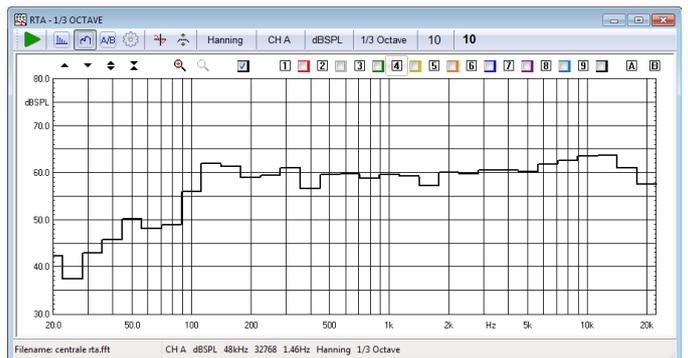
Sinusoidal Response + THD + Harmonics



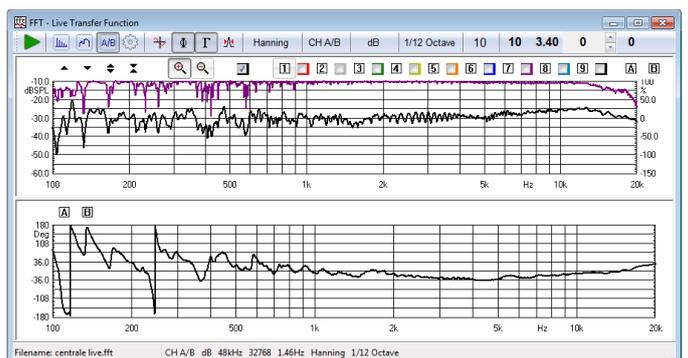
Sinusoidal Response + Impedance + Rub&Buzz



CEA test with narrowband FFT



Octave Bands RTA



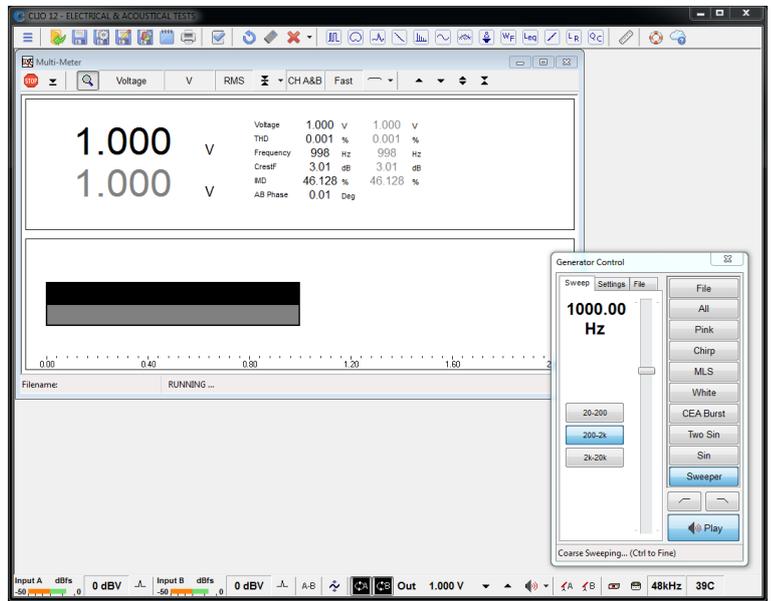
'Live' Transfer Function

period of time, very high power to the load.

## ■ MULTI-METER

The multi-meter control panel is a two channels real-time, interactive instrument, measuring:

- SPL (dBSPL, dBP<sub>a</sub>, dBA, dBC)
- Voltage (V, dBV, dBu, dBr)
- Displacement (m, dBmeter)
- Velocity (m/s, dBm/s)
- Acceleration (g, m/s<sup>2</sup>, dBm/s<sup>2</sup>)
- Current (A)
- Power (W)
- Frequency Counter (Hz)
- Distortion: THD, THD+N, IMD (% , dB)
- L-C-R Bridge (H, uF, Ohm)
- Crest Factor
- A/B Interchannel Phase
- Fast and Slow integration
- Low, High, Band Pass brickwall Filter

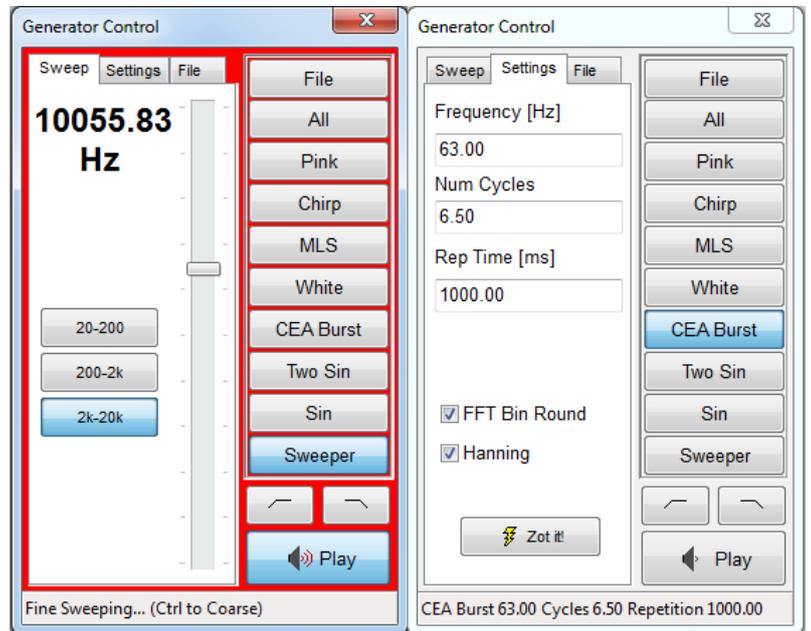


Multi Meter

## ■ SIGNAL GENERATOR

The programmable signal generator is capable of the following functions or signals generation:

- Sinusoids with FFT bin round
- Bursted Sinusoids
- Two Sinusoids
- Optimized CEA burst
- Multitones & All Tones
- Linear or Logarithmic Chirps
- MLS (Maximum Length Sequences)
- Pink and White noise
- Wave files (.wav) playback and save
- Interactive Sweeper
- Real time Hi pass and Lo pass Filters



Sweeper & Generator Control Panel

## ■ IMPEDANCE MEASUREMENT AND THIELE & SMALL PARAMETERS

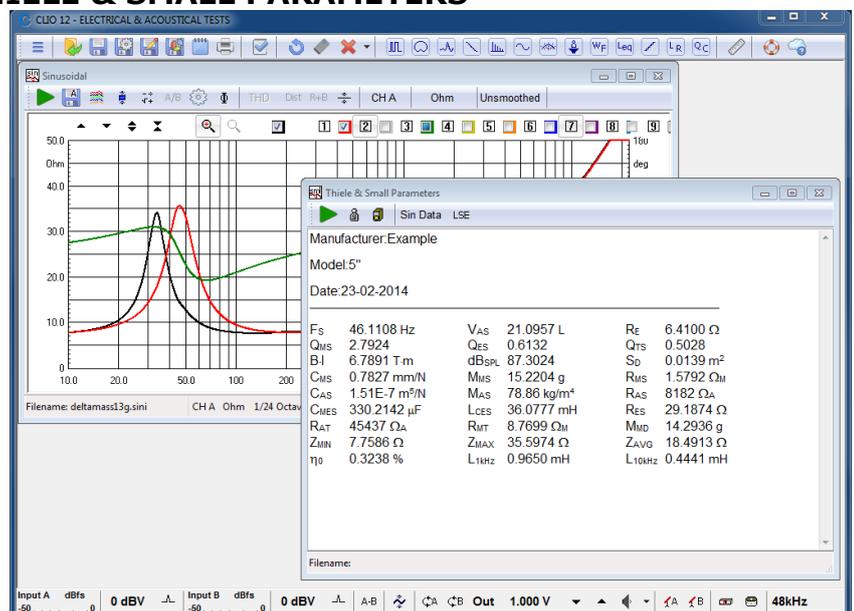
Impedance measurements can be done:

- with a **direct connection** to the analyzing hardware
- with an external amplifier and a **sensing resistor** both in constant current or constant voltage mode
- using the Audiomatica **QCBox Amplifier current sensing** feature
- by a **2-channels Voltage/Current** technique.

The estimation of Thiele&Small speaker parameters can be done:

- with the added-mass method
- with the known-volume method
- with a single-pass, non-invasive, laser displacement measurement

Available also least square error routines.

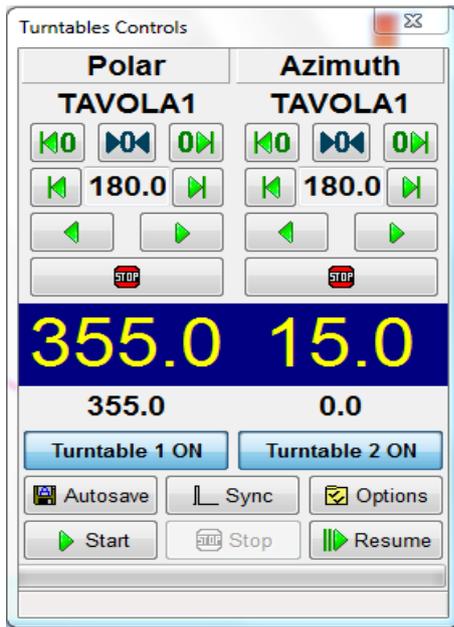


Impedance and T&S Parameters

## ■ DIRECTIVITY & 3-D BALLOONS

**CLIO** has the capability of measuring and analysing the radiation characteristic of a loudspeaker in space. Dedicated hardware controls for turntable systems and software management routines help you while capturing the often huge amount of data needed. Then the Directivity Analysis and 3-D Balloons processing routines permit the following analysis:

- Classical circular polar plots
- Color map directivity plots
- Waterfall-like directivity plots
- 3-D "Balloons" analysis
- Data export in text formats as EASE (.xhn), CLF (.tab) or impulse responses.



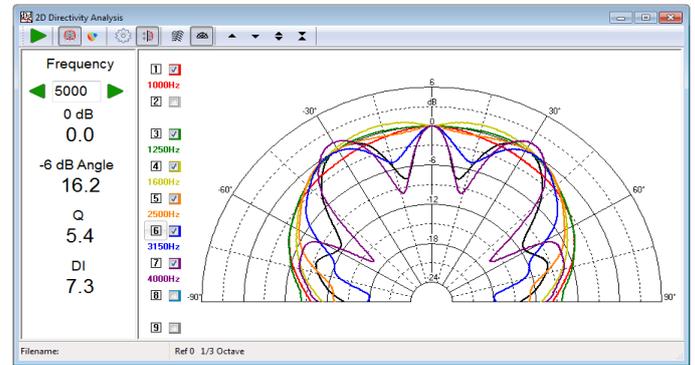
Dedicated turntable controls

## ■ TIME FREQUENCY ANALYSIS

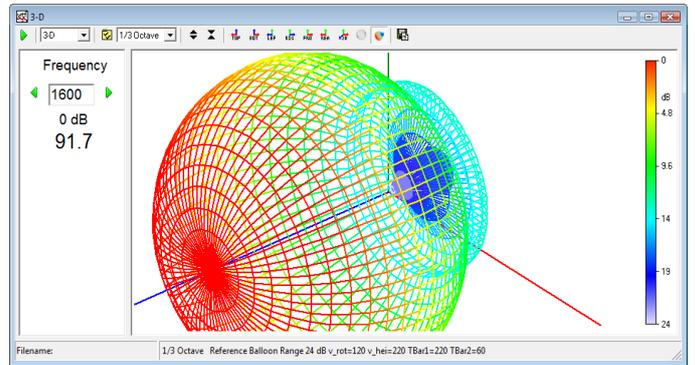
The Time Frequency Analysis tool allows to post-process impulse response measurements to obtain various representations of energy decay versus time.

The following results are possible:

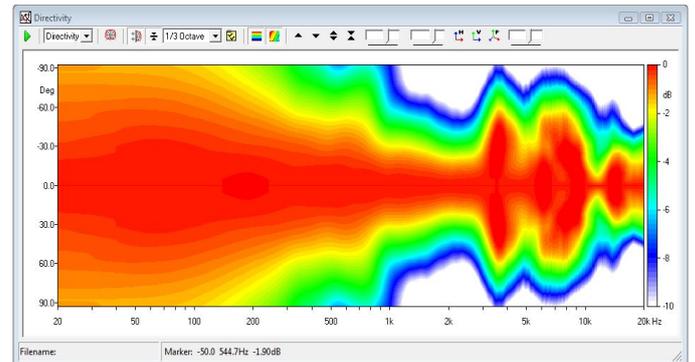
- Cumulative spectral decay (CSD)
  - Energy Time Frequency (ETF)
  - Wavelet Analysis (Time or Cycles view)
- Graphs can be viewed as classical 3D, Waterfall like, plots or as Color maps.



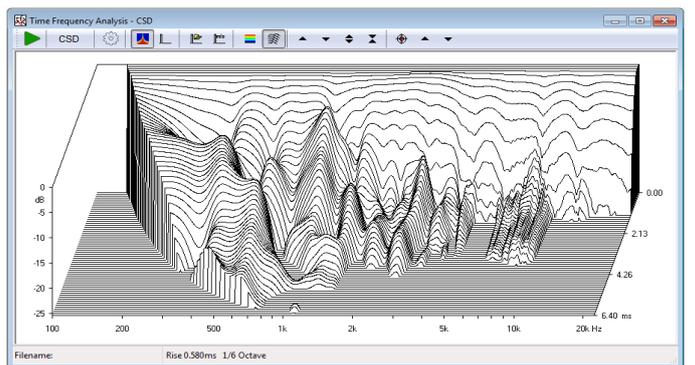
Circular Polar Plot



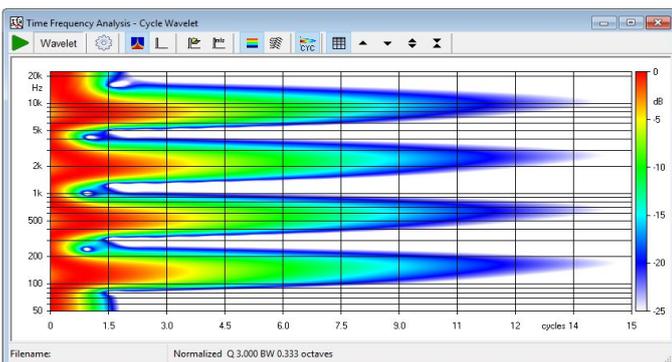
3D Balloon



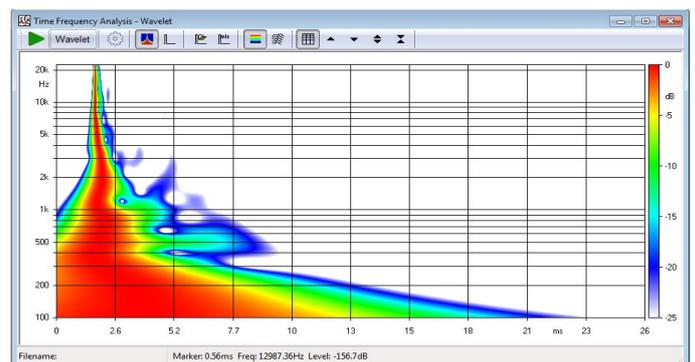
Color Map Directivity Plot



Cumulative Spectral Decay



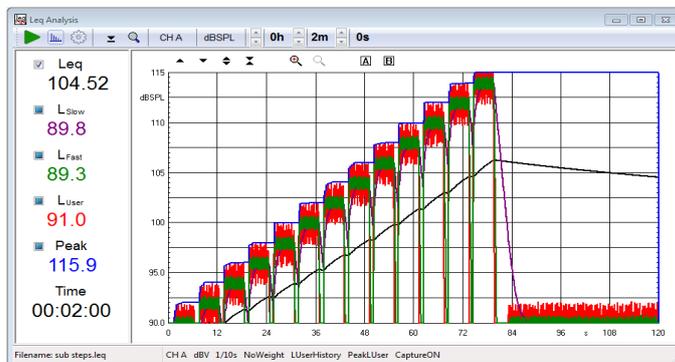
Cycle Wavelet Analysis



Wavelet Analysis

## ■ Leq ANALYSIS

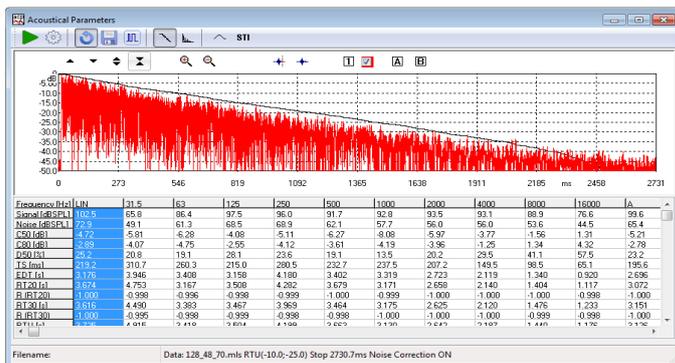
With the Leq Analysis control panel it is possible to execute **real-time capture and level measurement** of any kind of signal present at CLIO's input. The behaviour of the instrument closely resemble that of a graphical level recorder plus direct-to-disk data capture. When analyzing an acoustical event this control panel gives you complete information about the equivalent continuous sound level (Leq) and related quantities according to IEC 61672 standard; if used together the RTA frequency analysis you get a complete **integrating sound level meter**.



Leq Analysis

## ■ ACOUSTICAL PARAMETERS & STI

With the Acoustical Parameters control panel it is possible to evaluate the acoustical behaviour of a room and carry out sophisticated post processing of a measured impulse response to calculate the acoustical parameters as defined by the **ISO 3382** standard.



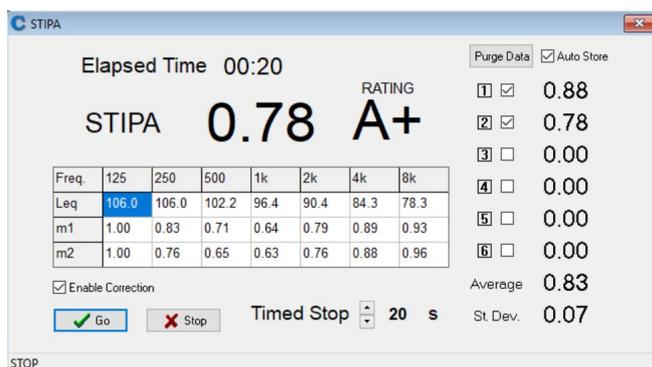
ISO 3382 Acoustical Parameters

The **STI, Speech Transmission Index**, is also calculated.

With the **STIPA Direct** tool it is possible a real-time interactive measurement.

A STIPA stimulus equalizer is present.

All these parameters characterize auditoria, concert halls and public venues where speech or music have to be reproduced.



STIPA Direct Tool

## ■ LINEARITY AND DISTORTION

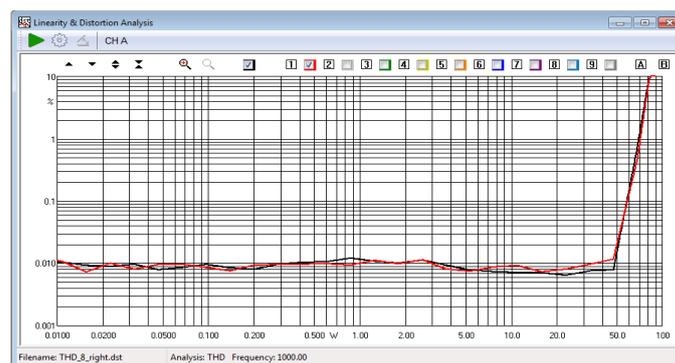
Linearity and Distortion analysis is a complete tool to inspect the non linear behavior of any electronic equipment as power amplifiers or preamplifiers.

■ Up to 1250W/80hm (higher with external attenuator)

■ THD vs. input or output

■ SMPTE, DIN, CCIFF Intermodulation

■ DUT's gain and deviation from linearity



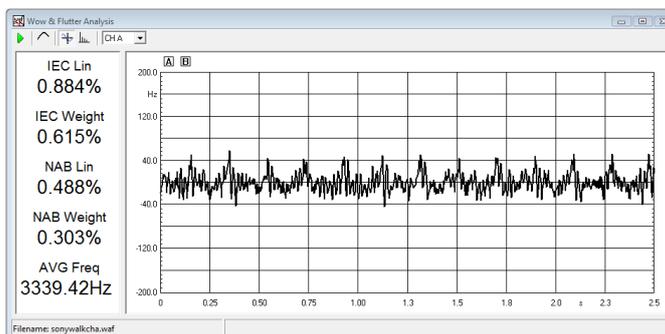
Distortion measurement vs. output power

## ■ WOW & FLUTTER ANALYSIS

**CLIO** executes Wow & Flutter analysis measuring the frequency modulation that follows instantaneous speed variations due to mechanical imperfections in analog recording or playback devices.

■ IEC and NAB standards

■ Time and frequency display



Wow & Flutter Analysis

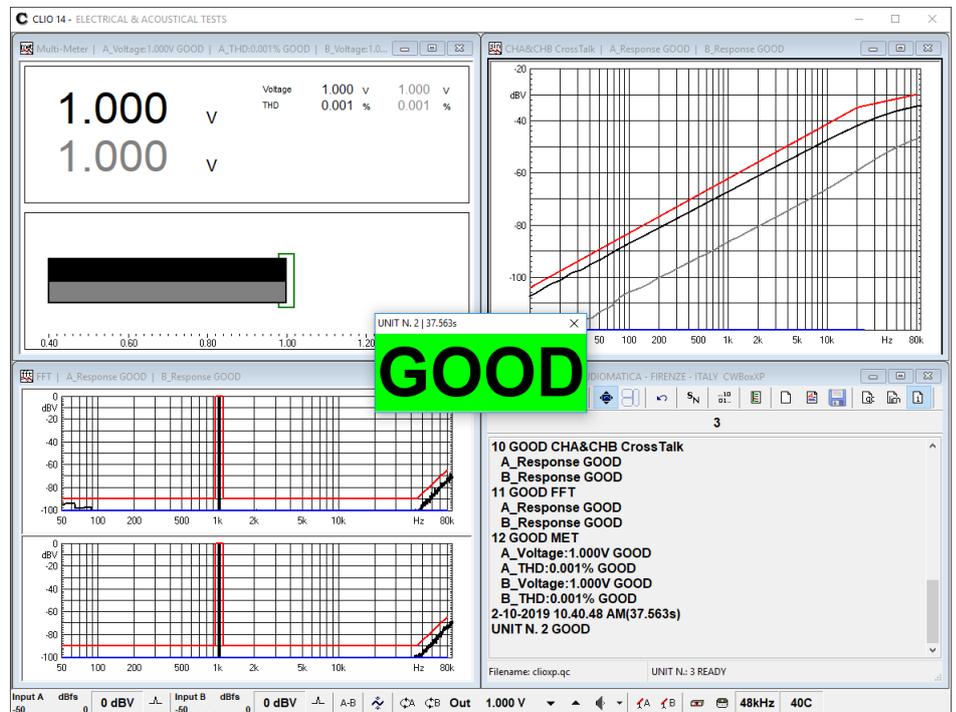
## ■ QUALITY CONTROL

The **Quality Control** software extension for **CLIO** is a powerful suite for executing state of the art production line testing.

■ **CLIO 14 QC** is able to test the production of loudspeakers, drivers, microphones, amplifiers and any other electroacoustic device.

■ **CLIO QC** can interact with external hardware or production line controllers in addition to PC peripherals to implement a fully automatic line.

■ **CLIO QC** is able to behave as a **TCP/IP measurement server** to let you write and implement your custom written code.



QC Session Desktop with Automatic Windows Tile.

■ **CLIO QC** takes full advantage of all the measurement techniques found in the CLIO standard software adding a versatile script processor capable of handling **a virtually unlimited sequence of tests** to accomplish even the most complex tasks.

■ On the other hand **one single ultra-fast sinusoidal test** may ensure you production **cycle times of less than 1 second**.

Some of the quality control tests possible within one single pass:

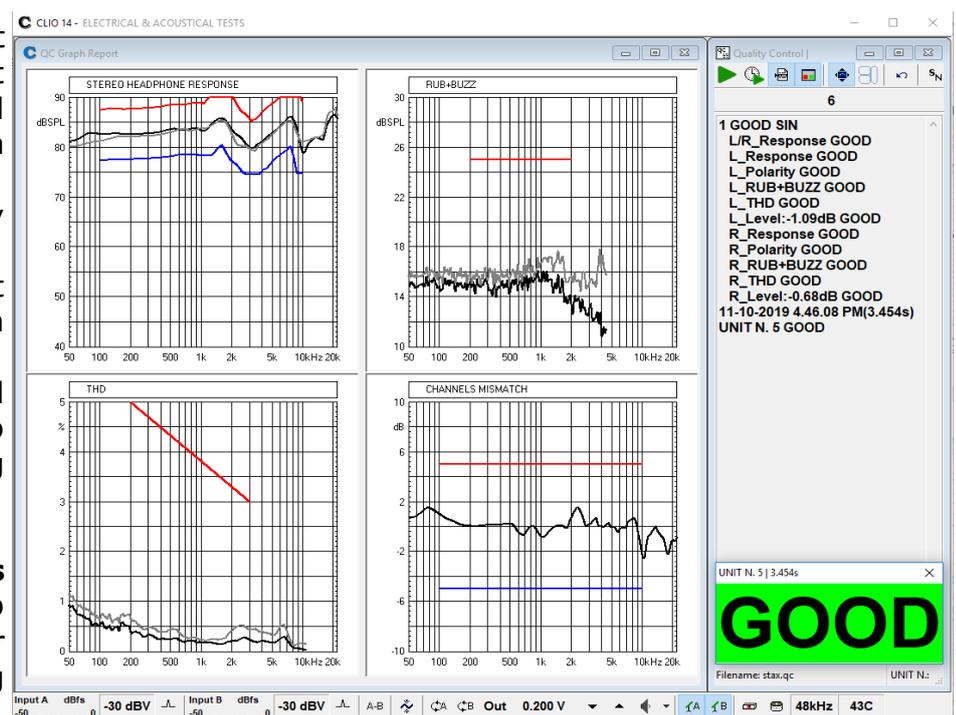
- Frequency response and impedance response (mono or stereo tests)
- Average level
- Sensitivity (average or up to eight frequencies)
- Polarity
- THD response
- Single harmonic response (from 2nd to 10th)
- Fast-Track™ Rub&Buzz
- T&S parameters (Fs, Qt, Qe, Qm, Cms, Mms, Mmd, Vas, Bl, dB SPL, Zmin)
- Loudness Rating (RLR,SLR, STMR)

■ **New graphical functions** let you display, not only final test results, but all the associated curves in different graphs inside a dedicated graph report window.

Each graph can be separately titled and formatted. Here we show a complete report from a single sinusoidal test of an earphone.

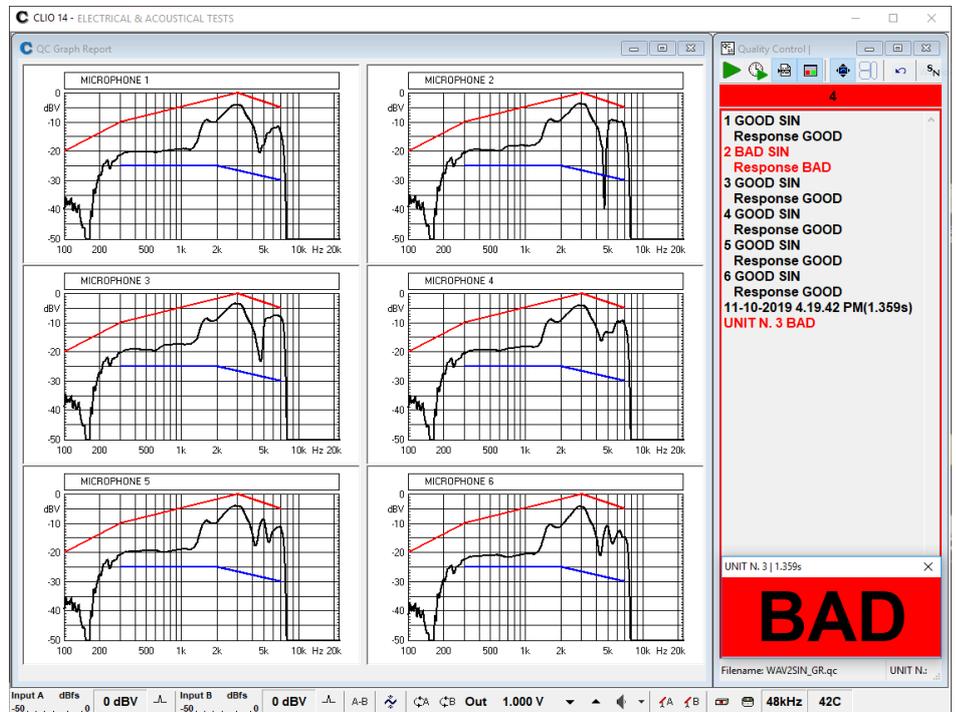
Inside the same graphical container it is also possible to accumulate more graphs coming from different measurements.

■ **Windows layout functions** let you define desired QC desktop settings and store them for later manual or automatic recall during testing.



QC with Graph Report Window and Custom Layout

- Dedicated support for last generation audio:
- Control of Windows Wave Capture or Play streams
- Bluetooth devices testing
- Support for automatic pairing
- New **WAV2SIN** processing that permits asynchronous QC test recording on multiple wave files and then analyze them.
- Extensive support for custom system commands and batches.
- Smart speakers testing
- Multichannel USB microphones
- ADB (Android Debug Bridge) testing
- ALSA (Advanced Linux Sound Architecture) testing



Multichannel Smart Speaker testing with WAV2SIN

## ■ POWERFUL HARDWARE CONTROL

The key feature of the CLIO System running **CLIO 14** is the precision, laboratory grade, **hardware control** that gives you complete, instant access to all the measurement parameters and let you easily interact via software to adapt your measurement interface to any environmental need; using CLIO you get **results** that are 100% warranted by the **CLIO X (FW-03)** hardware interface built by Audiomatica.

- Stereo input and output control
- Peak Meter to monitor input signal
- 0.1dB output level control
- Output DC voltage control



## ■ CLIO integrates the software control for the **Model 5 Amplifier, Switching & Testing box**:

- USB controlled
- 50W (80hm) output stage w/DC control
- Output stage current limit control
- 4 input w/phantom supply (programmable 0÷24V)
- 2 DC voltage measuring input
- I-Sense output with DC current measuring
- General Purpose I/O bits



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# CLIO

ELECTRICAL AND ACOUSTICAL TESTS