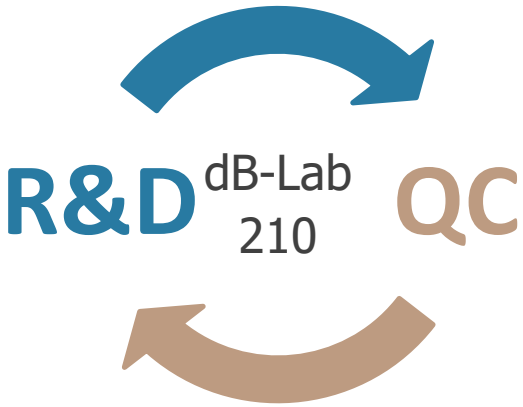
KLIPPEL ANALYZER SYSTEM



UNIFIED FRAMEWORK FOR R&D AND QC APPLICATION

dB-Lab Version 210 ↔ QC Version 6.1

FEATURES

- Modular hardware platform KLIPPEL Analyzer 3 (KA3)
- Combined software dedicated to R&D and End-of-Line application
- New software (LSI3, CRC, QC 6.1) exploiting KA3 capabilities
- Multichannel measurements
- Supports existing hardware (DA2, PA, PM8)
- Full compatibility with existing data and test setups
- Linked with *Klippel Controlled Sound*

BENEFITS

- Cost-effective and flexible hardware solution tuned to your application
- Same software from prototyping to mass production
- More functionality - simple to use by experts and operators
- Satisfying particularities of EOL testing (fast, sensitive, robust)
- Safe investment for reliable, long-term test solutions
- Easy exchange of setups and data
- Suite of tools for design, measurement and DSP

Updates in Existing Products

- dB-Lab – frame software
  - Supports KLIPPEL Analyzer 3
  - Support for KLIPPEL Dongle
  - Database stability update (for more information see TN10)
- LSI2 – changed definition of $R_e(T_v = 0\ K)$. The temperature is displayed referenced to the imported (cold) R_e using an additional curve. The temperature limit remains based on the determined R_e from the "Linear Mode"
- MSPM:
  - new distortion measures:
    - E_{lin}: Represents the error in between measured and identified linear model at excitation lines (replaces E_f).
    - Model Performance: This value in dB is intended to give an easy to understand dB value on how well the nonlinear model performs. Higher values are more preferable, whereas fitting is good if bigger than 6 dB to 9 dB. Replaces E_{Model}.
  - Excitation frequencies for MSPM Pro are now based on small signal parameters (customization is possible).
- SIM2 – Simulation
  - add fade-in for the simulated excitation signal to improve reaching steady state for certain enclosure configurations
  - auto-symmetrize peak/bottom-window around 0 value of the y-axis

New Klippel Software Modules:

- CRC – Complex Room Compensation:
  Correction filter for compensating room influence in standard measurements
- LSI3 Woofer – Large Signal Identification Woofer (for KA3)
  - Advanced nonlinear model
  - Dedicated to electro-dynamical transducer (f_s < 500 Hz)
  - Driver in free air, vented, sealed enclosure
  - Start with given small signal voltage
  - Import custom voice coil material coefficient
  - Improved excitation noise generation
    - Less heating by band-pass boost around resonance
    - Adjusted frequency range for excitation band-pass
  - Switch speaker polarity when viewing data
- LSI3 Micro-Speaker (for KA3)
  - Advanced nonlinear model
  - Dedicated to headphones drivers and micro-speakers (f_s < 2 kHz)
  - Optimized signal crest factor using multi-tone excitation
- HMA – Higher Order Modal Analysis:
  Automatic extraction of modal parameters from SCN measurements and FEA simulations
- SIM-AUR – Simulation-Auralization:
  Nonlinear and thermal simulation and auralization of speaker performance with music
- STAT – Statistics (Beta)
  - Statistical overview of measurement data (curves + single values)

    - Visualization of variances and fast comparison between batches
    - Intuitive calculation of limits (parameter-based or interactive)
    - Quick grouping of test objects in pools (e.g. “good”, “bad”, “borderline”) manually or automatic via thresholds (limits)
- The QC framework module is now available as a general dB-Lab measurement module (KA3 required); the following QC Tasks are available (operation templates are available):
    - ALD Air Leak Detection / ALS Air Leak Stethoscope
    - BAC Balanced Armature Check
    - MSC Motor + Suspension Check
    - LST Linear Suspension Test
    - IMP Impedance
    - SPL Sound Pressure
    - EQA Equalization & Alignment
    - EXD External Devices

  →Close the gap between R&D specifications and end-of-line test results

QC 6.1 Features in dB-Lab 210

Hardware Support

- Supports KLIPPEL Analyzer 3 (see *Support of New KLIPPEL Analyzer 3 (KA3)* below)
- Multichannel measurement: up to 8 input channels (4 input channels + voltage and current for 2 speaker channels)
- Supports multichannel 3rd party soundcards with up to 4 input channels
- Last version supporting *Production Analyzer* with Firewire Interface (hardware upgrade available)

Workflow

- Batch processing of multiple QC operations; may also be combined with R&D operations
- Complex testing of systems like smart speakers or digital headsets (various sample rates, audio devices, long test sequences)
- Summary verdict collector and overall verdict for batch processing
- Activate/deactivate tasks in the test sequence with just a click
- New access to calibration routines from dB-Lab menu *Tools*
- New feature option: conditional skip/repeat option for a task (*Sequence Control*)
- Improved feature option *Serial Number Validation*: validation of serial number length

Infrastructure

- Wave file export of Rub&Buzz time signal for monitoring and diagnostics
- Sparse wave export for PASSed test objects
- Wave file import is independent of the used measurement device
- Easy migration of customized scripts / software to main QC software version
- Easy case studies by reprocessing wave files of multiple test objects, e.g. reprocess data with a different Rub&Buzz filter setting - how does the yield change?
- Signal sharing: high speed testing by sharing measurement data with other tasks. Multiple and multi-channel analysis available based on single measurements.
- Update of hotkey management, smooth interaction with 3rd party software
- Manual Sweep: dialog is not exclusive (modal) anymore. Zoom and other customization supported.

Results and Signal Processing

- Standardized/preferred/user defined result frequencies (ISO)
- On-line monitoring of Rub&Buzz audio signal using standard PC soundcard (for SPL task and manual sweep)
- Higher Order Harmonic Distortion (HOHD)
- HI-2 distortion
- Distortion measures relative to frequency response or average level (in dB or %)
- Normalized frequency response relative to Golden DUT, reference DUT pool average or average level
- Manual Sweep: Rub&Buzz waveform added, live audio monitoring
- New feature option: *Step Sine* stimulus for comparison purpose

New & Updated Modules

- Impedance (IMP): new *TSX* add-on – full TS parameter set based on laser displacement measurement (Hx(f), Bl, Mms, Rms, Cms, Vas); KA3 hardware required
- Sound Pressure + Impedance (SPL-IMP): measure U, I, Mic 1 & 2 simultaneously with KA3 hardware - measurement of impedance, sound pressure and ambient noise at the same time for up to two DUTs (e.g. headphone)
- Sound Pressure (SPL): laser measurement for checking dynamic shift of coil position (DCX)
- Equalization & Alignment (EQA):
    - measurement and control of displacement (AC and DC)
    - Single value results (e.g. average level) can be used as alignment target for sweep signal
- Linear Suspension Test (LST): now supports MSPM Bench for small diaphragm measurement

Accessories:

- New USB temperature and humidity sensor

Support of New KLIPPEL Analyzer 3 (KA3)

- Adaptable, modular hardware concept
- Wider frequency range ($f_s \leq$ 192 kHz)
- Excellent sensitivity, SNR and distortion
- Sturdy, compact hardware at high performance
- Flexible speaker channels with switchable current sensitivity (controlled by software)
    - standard (e.g. woofer)
    - high-sensitivity (e.g. micro-speaker)
- Comes with a second laser-input in standard configuration
- Internal power amplifier (50 W)
- New measurement modules for evolving needs