

Resonance Analyzer

Resonance Analyzer Software Tool

High speed analysis of piezoelectric sensors and multilayer actuators.



■ Application

Production of piezoelectric sensors and multilayer actuators

- Quality control during production
- Measurement of mechanical and electrical properties during production
- Classification of actuators during production

■ Performance

- A single electrical small signal measurement checks mechanical and electrical properties
- Customized adaption of quality criteria to specific device requirements
- Highly reduced testing time
- Highly reduced effort
- Variance comparison (Matching of measured target with reference sample)
- Update service
- User support

■ Features / Specifications

The Resonance Analyzer significantly reduces the time and effort for analysing piezoelectric sensors and actuators. Analyzing specific resonance's in the impedance spectrum and providing data on this resonance quality greatly improves production quality control.

Hence, special figures of merits can be extracted, so that a single electrical signal measurement helps to check mechanical and electrical properties of the devices. A comparison between the measured curve and an idealized or simulated one enables the individual adaptation of quality criteria to specific device requirements.

1. Measurement analysis

- Extraction of minima and maxima in the impedance curve in a given frequency range
- Setting of a threshold for which minima and maxima are considered as resonance pairs (which form a resonance peak) in correlation to the previous and subsequent extremal values
- A split of the base resonance in two or more resonance peaks is considered as a fault of the sample and is used as first exclusion criterion for the device
- Setting of the position of the base series resonance frequency, the maximum tolerable deviation to it, and of a minimum effective coupling coefficient as additional criteria to evaluate the measurement.

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2. Comparison of the measurement with simulation data or a otherwise derived reference curve

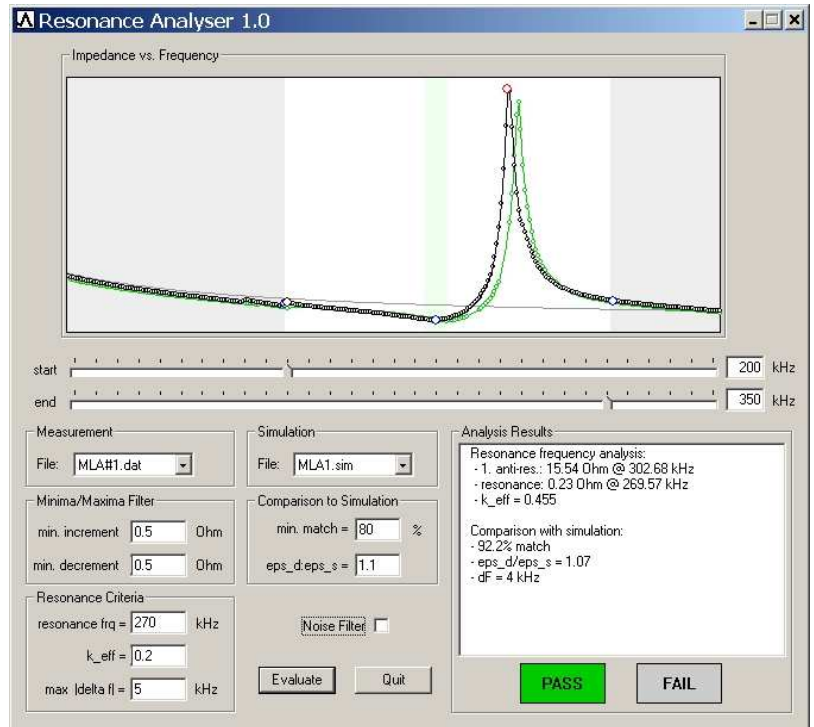
- Examination of the matching between measured and simulated curve in the given frequency range. Set of a mandatory fit (in %) as quality mark for the device
- Evaluation of the series resonance deviation
- Setting of the tolerable deviation of the sample capacity ($\epsilon_{\text{Data}}/\epsilon_{\text{Simulation}}$).

We regularly update the Resonance Analyzer based on user feedback at least once a year.

- Free update service for 18 months
- Individual updates
- Maintenance service

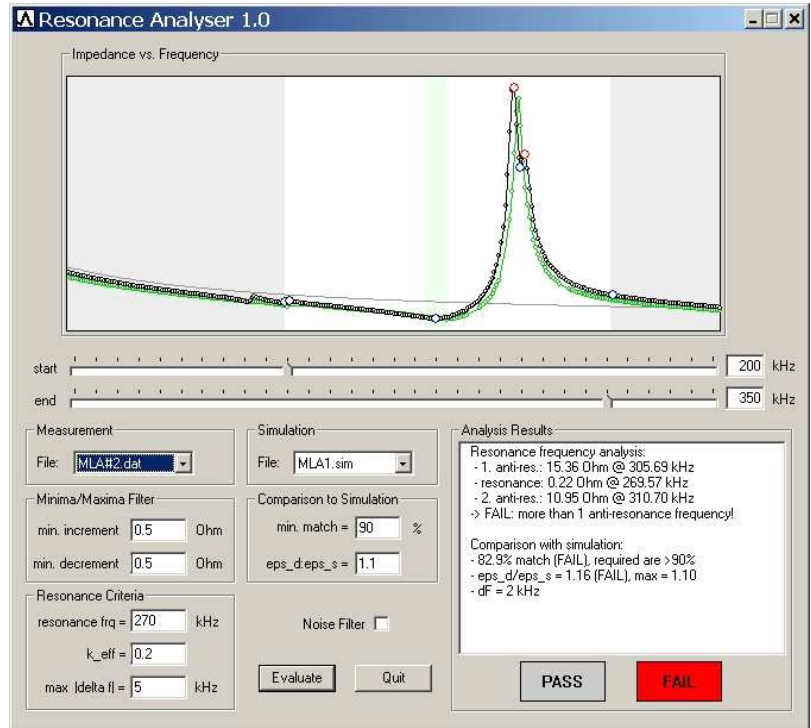
■ Sample Measurements

- "Pass"
Sample with slight shift of the resonance frequency but very good match of the resonance characteristics in comparison to a simulated ideal resonance curve (green).



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- "Fail - splitted resonance"
Resonance with a splitted length resonance which results in a less good match of the curves. In addition, the sample has a deviation in the measured capacitance.



- "Fail - high frequency shift"
Sample with a very good match between measured and simulated resonance (99,2%) but with a too high frequency shift (7 kHz).

