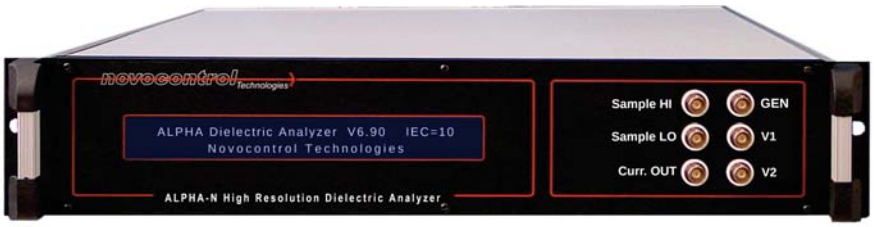


ALPHA
High Grade Dielectric Analyzer

- Self-sufficient analyzer for frequency-dependent measurements without compromises
- Ultra-wide requency range: 3 µHz ... 40 MHz
- Ultra-wide impedance range: 10 mΩ ... 100 TΩ, covered in one single measurement set-up
- Highest phase resolution of 0.001° to capture even the smallest losses in materials (tan δ > 3×10^{-5})
- Fast data acquisition rate: 60 ms/point
- Optionally 1.7 ms/point in direct mode
- User-performed and software-assisted automatic self calibration and diagnosis compensates long term internal drift and verifies functionality.
- Harmonics measurements to analyze non-linearity effects
- High level command set for easy programming
- Powerful DETACHEM software package for turnkey applications

ALPHA

DISTRIBUTOR CONTACT:
CALTRON PTE LTD
email: caltron@caltron.sg
www.caltron.sg

The fastest route to new materials

The Novocontrol ALPHA broadband dielectric⁄ impedance analyzer provides access to the full electrical characaterisation of materials and devices. Complex parameters like impedance, admittance, permittivity, conductivity, are easily accessible with ultra-high precision and accuracy.

Electrical impedance measurements on materials analyze the property to store and transfer electrical charge. Materials properties are analyzed in terms of complex properties, e.g., the permittivity ε or conductivity σ. In the permittivity representation, δ denotes the phase angle between its imaginary and real parts, and tan δ=ε"/ε' represents dielectric loss.

When it comes to low-loss materials, the crucial property of a frequency response analyzer is its phase resolution. In this respect, the ALPHA offers unsurpassed performance, i.e., a very high phase resolution of less than 0.001°, equivalent to a tan δ resolution of 10^{-5}.

Ultra-Wide Impedance Range

The ALPHA broadband dielectric analyzer offers a unique measurement solution which covers up to sixteen decades of impedance. Values between 10 mΩ and 100 TΩ are determined continuously, i.e., without changing the setup. The ALPHA series analyzers (models differ in their maximum frequency) are thus capable to fully characterize a wide range of materials spreading from the best insulators to good conductors.

Ultra-High Phase Resolution

In order to reach ultimate accuracy, especially with respect to low-loss materials, the ALPHA uses a particular **reference technique**. For each selected frequency, the measured sample impedance is compared to the measured impedance of a precision low-loss reference capacitor. The reference measurement eliminates all linear systematic deviations from the sample impedance. This technology, in combination with a straightforward digital design, achieves the highest level of accuracy required for materials analysis, particularly for broadband spectroscopy of low-loss dielectrics.

Harmonics Analysis

In general, the electrical behavior of materials is expected to be linear. Some materials, however, exhibit an intrinsic non-linear behavior or are deliberately made non-linear for certain purposes or applications. The ALPHA analyzes higher harmonics of such materials by complex Fourier transformation. This opens the way to a new range of experiments, known as non-linear spectroscopy.

Specifications:

Ranges

Frequency: 3 µHz ... 40 MHz (13.1 decades)*
Impedance: 10^{-2} .. 10^{14} Ω (16 decades)
Capacitance: 1 fF ... 10 F (16 decades)
Loss factor tan(δ): 10^{-5} .. 10^{4}
AC signal out: 100 µV .. 3 Vrms
DC bias out: -40 VDC .. +40 VDC, 70 mA max**
Signal generator output impedance: 50 Ω
Voltage input: < ± 4.3 Vp dc or ac coupled

Base Accuracy

Relative Impedance, Relative Capacity,
Loss factor tan(δ): < 3.10^{-5} ***
Phase Angle: < 0.002° ***

Resolution

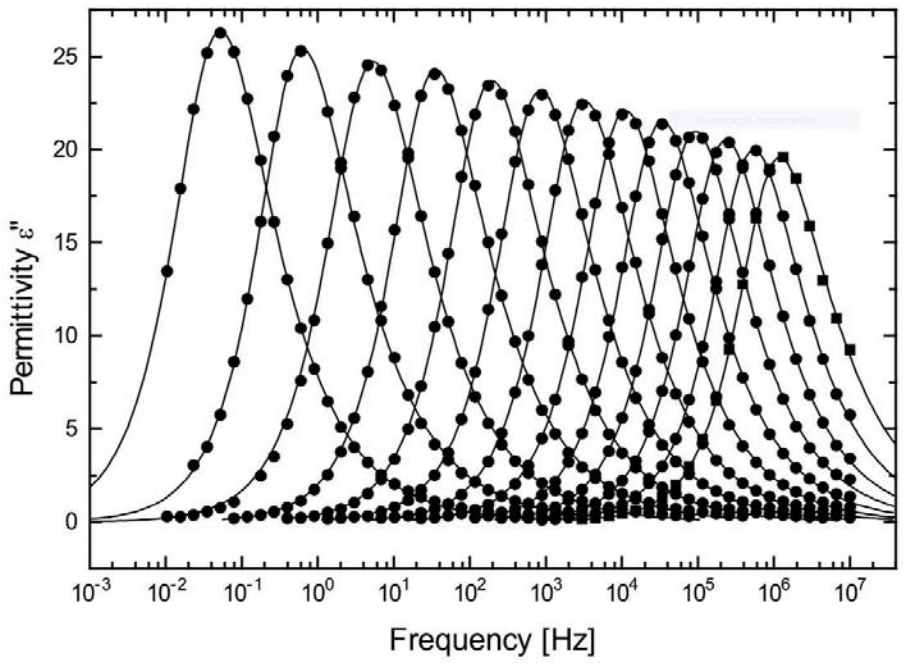
Relative Impedance, Relative Capacity,
Loss factor tan(δ): < 10^{-5}
Phase Angle: < 0.0006°

User Calibrations

load, short, open, internal self calibration and diagnostics

System Interface: GPIB/IEEE488

* for the top-model ALPHA-T
** requires dc bias option B of the ALPHA
*** for details refer to specification charts



The imaginary part of the permittity, ε', of glycerole, measured with the ALPHA analyzer. Temperatures from -80 °C to 20 °C in 5 °C steps; peak positions shift to higher frequency with increasing temperature.