

# Keysight Technologies

## Continuous Dynamic Analysis (CDA) Option

Data Sheet



Keysight CDA option

### Features and Benefits

- Enables mechanical properties to be determined continuously as specimen is strained
- Seamless compatibility with the Keysight Technologies, Inc. T150 UTM
- Allows complex moduli to be measured at various preload values over a range of strains
- Operation over a range of frequencies permits better understanding of viscoelastic response of materials

### Applications

- Dynamic studies of compliant fibers
- Dynamic studies of biological materials
- Dynamic studies of polymers and composites

### Continuous Dynamic Analysis (CDA) Option

Until recently, accurately determining dynamic properties for specimens at the nanoscale has been limited to fixed-strain investigations – posing significant technical challenges for improving the understanding of material behavior.

The Keysight Continuous Dynamic Analysis (CDA) option provides a simple means of determining dynamic properties, such as storage and loss modulus and  $\tan \delta$ , with the Keysight T150 UTM. This innovative option utilizes a technique whereby a nanomechanical actuating transducer head applies an oscillatory force that is superimposed over the nominal force. The amplitude of the oscillation is measured by a capacitive sensor that is an integral part of the nanomechanical actuating transducer head. As a result, the technique can be used to impose oscillatory forces at a higher frequency than is achievable by imposing an oscillation via the crosshead. CDA also provides the advantage of measuring complex moduli over a range of frequencies.

The CDA option offers a direct, accurate measurement of the specimen's stiffness at each point in the experiment, enabling mechanical properties to be determined continuously as the specimen is strained. By measuring both the amplitude and phase relationships between the load and displacement oscillations, the CDA option makes it possible to determine storage and loss modulus. The option enables T150 UTM users to gain access to dynamic properties information continuously through the force curve, providing a wealth of information on the material's response.

## T150 UTM

The state-of-the-art Keysight T150 UTM enables researchers to understand dynamic properties of compliant fibers via the largest dynamic range in the industry and the best resolution on the market (five orders of magnitude of storage and loss modulus). It also lets researchers investigate tension / compression properties of biological materials via the CDA option.

T150 advantages include fast, accurate generation of real-time test results, improved understanding of strain-rate-sensitive materials and time-dependent response, and improved statistical sampling in biomaterials applications.

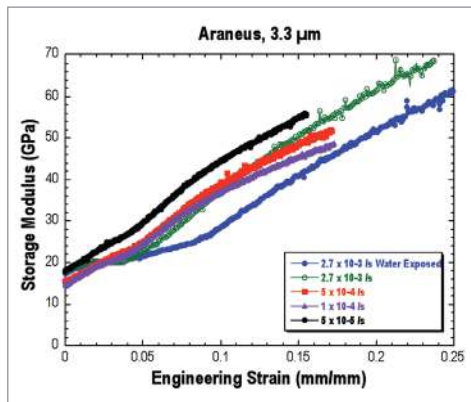


Figure 1. Viscoelastic time-dependent behavior of small diameter compliant fibers using the CDA option over a range of strains.

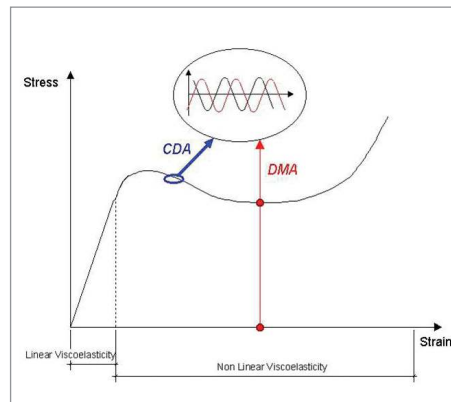


Figure 2. The T150 with the CDA option imposes a small oscillation on a material that is being simultaneously subjected to a variable quasi-static strain and can provide material properties over a range of strain in one experiment.

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)  
[www.keysight.com/find/nanoindenter](http://www.keysight.com/find/nanoindenter)

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Nanoindentation instruments from Keysight Technologies conform to ISO 14577 and ASTM 2546 standards, delivering confidence in test accuracy and repeatability.

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### Keysight CDA Option specifications

Force amplitude range	0.1 $\mu$ N to 4.5 mN
Frequency range characterization of instrument dynamic response (sample dependent)	0.01 Hz to 200 Hz