Introduction

- Exceptional accuracy and repeatability
- Impedance and DC resistance measurements (Option 001)
- High test throughput with scanner interface (Option 301)

This application brief describes how the Keysight Technologies, Inc. E4980A improves the test efficiency of electromagnetic MEMS optical switch actuators.
Keysight E4980A Precision LCR Meter

The Keysight E4980A Precision LCR Meter, with extremely high accuracy and speed, is the ideal tool for research and development, as well as manufacturing test.

Electromagnetic MEMS Optical Switch Actuators

For MEMS optical switches as well as other devices, the electromagnetic actuator is often used as the actuator of the movable part. A micro coil and magnetic material operate the object. The basic principal of operation is the same as that of a mechanical relay.

High-Accuracy Measurement of Switch Actuator Coil Inductance

Characteristic of a coil can be obtained by measuring its impedance, the electric characteristic of a coil. As DC is used for the coil in a switch, inductance and DC resistance are the important parameters. As the coil of the electromagnetic MEMS optical switch is created by micromachining, precise measurements are required to determine its characteristics. Measurement of impedance, therefore, requires an instrument with high measurement accuracy and repeatability.

The Keysight E4980A Precision LCR Meter, which provides 0.05% basic impedance accuracy and superior repeatability, is ideal for evaluating the impedance of a MEMS electromagnetic actuator.

Simultaneous Measurements of DC Resistance and Inductance

One of the most important parameters of the coil is DC resistance. In addition, the failure mode of the switch actuator coil is generally open and DC resistance measurement is helpful to detect that failure. The DC resistance meter, however, can measure only DC resistance and to evaluate inductance, another measurement instrument is required. The Keysight E4980A is a compact solution and with Option 001, also provides the DC measurement capability. Simultaneous measurements of inductance and DC resistance (Ls–Rdc) can be performed without re-routing AC and DC test signals to different instruments.
High-Speed Measurement Maximizes Manufacturing Test Throughput

Throughput is always a major issue in the manufacturing test process. The Keysight E4980A Precision LCR Meter achieves a measurement speed that is five times as fast as the legacy Keysight 4284A, which improves test productivity in both design and manufacturing. In addition, the 128-channel scanner interface option (Figure 2) maximizes the test throughput without sacrificing the measurement accuracy. The instrument has all compensated data up to 128 channels so it can quickly get the corrected measured data inside the instrument. This also dramatically improves the total throughput because users will not need to take extra time transferring measured data and corrected data back and forth between an external controller and the instrument.

Figure 2. Keysight E4980A scanner interface

Summary

The Keysight E4980A Precision LCR Meter, which provides highly accurate, repeatable, and high-speed measurements, is the ideal measurement instrument for testing MEMS electromagnetic actuators. Using the DC parameter measurement function (Option 001) and 128-channel scanner interface (Option 301) together can improve test productivity in both design and manufacturing.

For more information, please refer to the following literature and websites:
- Keysight E4980A Brochure (P/N 5989-4235EN)
- Keysight E4980A Data Sheet (P/N 5989-4435EN)
- Keysight Technologies Impedance Measurement Handbook (P/N 5950-3000)
- MEMS/NEMS Device Measurement Solution: www.keysight.com/find/mems
- Keysight E4980A Precision LCR Meter: www.keysight.com/find/e4980a
Evolving Since 1939

Our unique combination of hardware, software, services, and people can help you reach your next breakthrough. We are unlocking the future of technology. From Hewlett-Packard to Agilent to Keysight.

myKeysight
www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

www.keysight.com/find/emt_product_registration
Register your products to get up-to-date product information and find warranty information.

Keysight Services
www.keysight.com/find/service
Keysight Services can help from acquisition to renewal across your instrument’s lifecycle. Our comprehensive service offerings—one-stop calibration, repair, asset management, technology refresh, consulting, training and more—helps you improve product quality and lower costs.

Keysight Assurance Plans
www.keysight.com/find/AssurancePlans
Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight’s measurement expertise and product breadth, combined with channel partner convenience.

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

Americas
Canada  (877) 894 4414  
Brazil  55 11 3351 7010  
Mexico  001 800 254 2440  
United States  (800) 829 4444

Asia Pacific
Australia  1 800 629 485  
China  800 810 0189  
Hong Kong  800 938 693  
India  1 800 11 2626  
Japan  0120 (421) 345  
Korea  080 769 0800  
Malaysia  1 800 888 848  
Singapore  1 800 375 8100  
Taiwan  0800 047 866  
Other AP Countries  (65) 6375 8100

Europe & Middle East
Austria  0800 001122  
Belgium  0800 58580  
Finland  0800 523252  
France  0805 980333  
Germany  0800 6270999  
Ireland  1800 832700  
Israel  1 809 343051  
Italy  800 599100  
Luxembourg  +32 800 58580  
Netherlands  0800 0233200  
Russia  8800 5009286  
Spain  800 000154  
Sweden  0200 682255  
Switzerland  0800 805353  
Opt. 1 (DE)  
Opt. 2 (FR)  
Opt. 3 (IT)  
United Kingdom  0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-9-7-17)

DEKRA Certified
ISO 9001:2015 Quality Management System

www.keysight.com/go/quality
Keysight Technologies, Inc.
DEKRA Certified

This information is subject to change without notice.
© Keysight Technologies, 2017
Published in USA, December 1, 2017
5989-6519EN
www.keysight.com