

# Scalable LXI DAQ Solution for MEMS Transducer Testing



Micro-Electro-Mechanical Systems (MEMS) transducers are important for any electro-mechanical measurements that need to be made in a small footprint, such as monitoring pressure on a miniature piece of electronics. MEMS-based sensors are used in critical automotive, medical and industrial applications worldwide. For example, automobiles can electronically monitor tire pressure and report it to the driver using this technology.

This company manufactures MEMS pressure transducers, which are pressure sensors specifically designed to fit into a micro-sized footprint. For this company's specific product, the transducers are made for printed circuit boards. As an end-to-end solution, the integrated circuit provides signal conditioning and digitizes the transducer output. In some cases, the transducer even applies calibration coefficients to the digitized voltage.

## MEMS Transducer Testing: Why It's Important

To ensure quality, each transducer is verified for functionality and accuracy. Testing requires an excitation source (voltage or current) and then a voltage or resistance measurement to read the transducer output. Verification occurs across a wide temperature spectrum and should be done in parallel for large batch quantities.

## The Challenge: Cost-Effective, Automated MEMS Testing

In the past, MEMS testing had been a long and arduous task for the customer since it was mostly a manual process involving benchtop equipment. The company was looking for an affordable, automated process that would drastically decrease test time and improve throughput.

The customer initially planned to use a programmable power supply as an excitation source for all the DUTs being tested in parallel. For a current-based excitation source, external circuitry would be required to make the conversion from voltage to current, as well as to ensure a stable, uniform current value from channel to channel.

After considering solutions from two other instrument suppliers, the company approached [VTI Instruments](#) for help.

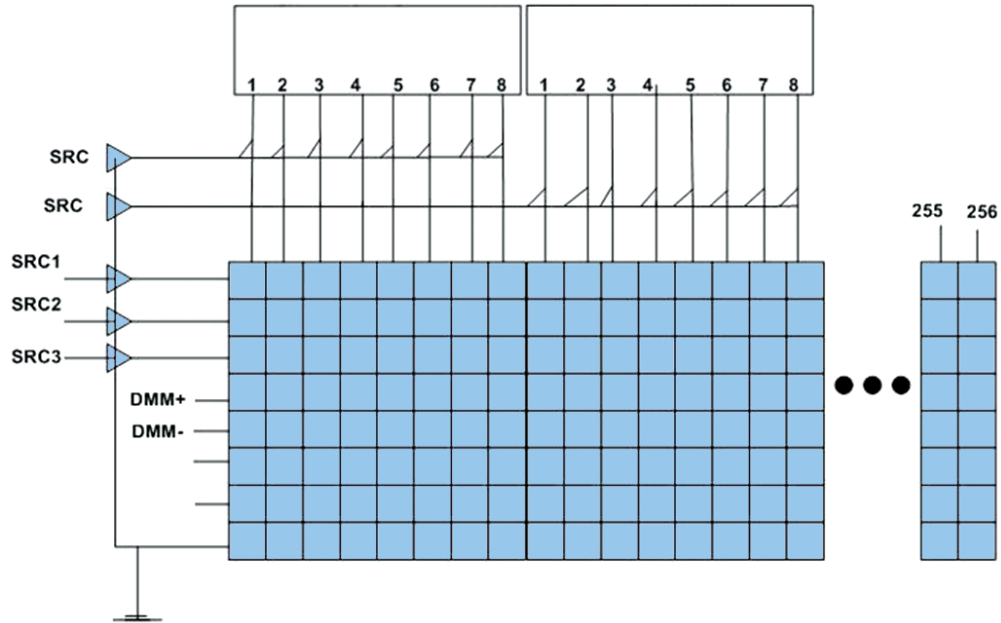
## The Solution: LXI DAQ System With Increased Test Throughput

After taking the time to fully understand the application, VTI presented the customer with a [DAQ](#) solution that was able to provide an individual excitation source for each DUT in the system at a reasonable cost per channel. VTI's analog sources can be programmed to provide either current or voltage on a per-channel basis.

To meet the customer's needs, VTI provided several instruments from its [EX1200 series](#) of precision switch, measure and control products: the [EX1266](#), [EX1262](#), [EX1200-4128](#), [EX1200-3164](#), [EX1200-3604](#) and [EX1200-3608](#). The EX1200 is the highest density switching platform available and the only LXI Class A subsystem on the market. It includes a full-featured 6.5 digit DMM, precision analog and digital I/O modules, and an internal analog expansion bus.



The scalability of the EX1200 allows the customer to add DMMs at a manageable cost, which also increases the throughput of the overall system. The competition was unable to provide comparable solutions that would scale up in size at a reasonable price.



- This system was built to test trays of several chips at once. One source is dedicated to each chip, which is fed into the (1 X 8) multiplexers. Therefore, the source can be routed to any of the eight pins and used as either a current or a voltage source. Three general purpose sources, which feed into the matrix, were needed. For example, some chips required 5V power and one chip required voltage for its I2C component. All voltage signals can be routed and managed using the switching matrix.
- The diagram shows two chip styles, each with different pinouts. However, the system was built to arbitrarily test eight pin chips, regardless of pinout. In any given test, all the chips will be the same style.
- The sources are all a combination of EX1200-3604 and -3608 DAC cards.
- The design allows DMMs to be added when increased throughput is required.

Due to the success of this DAQ system integration, this MEMS testing company is considering purchasing more EX1200 instruments for the future. The company may also use VTI hardware for a new tester in development that will be marketed to other companies.

## About VTI Instruments Corporation

VTI Instruments delivers precision instrumentation for electronic signal distribution, data acquisition, and monitoring. The company continues to lead in the development of open standards for test and measurement along with scalable, modular products that maximize performance in a small footprint. With nearly two decades of experience primarily in the aerospace, defense, and energy and power generation markets, VTI helps customers maintain a competitive edge and preserve the integrity of their brand.