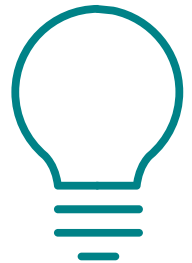


# Functional Tester for Diffractive Optical Elements (DOE)



Alfamation, a leading provider of state-of-the-art turnkey test and measurement solutions, has launched its Wafer Level Tester for Diffractive Optical Elements (DOE), for high-volume micro-optics testing in a production line. This gives manufacturers quick and precise feedback to optimize and monitor their processes, as well as full wafer mapping and quality control to identify defective elements.

A **DOE** is as an optical structure on a glass substrate acting as a lens, such as in the camera module in a smartphone. DOEs are increasingly used today, for example for facial recognition in a phone. This machine is meant to test optical properties mainly at wafer level, although diced parts loaded on a tray can be tested too. Wafers up to a diameter of 400 mm with thousands of DOEs can be tested and qualified in one fully-automatic test run at high speed.

“The new system uses an innovative measurement method, with a custom-designed ‘relay optic’ that collects all light coming out from the DOEs over a wide field of view and focuses it on a large camera sensor” said Mauro Arigossi, CEO of Alfamation. “With this methodology, the sensitivity is higher than competitor’s ATE based on a projection screen, because all light to be measured goes directly into the sensor, which enables faster tests and higher throughput in production.”

The **DOE** tester includes a custom-made wide angle conoscope lens coupled to a high-resolution camera. A collimated laser beam with controlled diffraction optical system is used to stimulate the DOE, which creates a diffractive pattern made of numerous output beams. The laser source is a super stable fiber-coupled laser diode paired with a series of beam-shaping optical elements that allow flexible beam shape and polarization state to meet customer-specific requirements



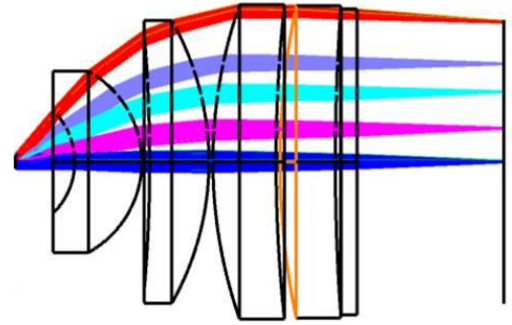
The output image sensed is then transferred to the computer to be processed by a fast algorithm which applies on the diffraction pattern different metrics like single spot uniformity error and total power efficiency of the DOE. The system provides a maximum field of view (FOV) of 90° by 90°, with resolution over the whole FOV of 0.25°.

The new **ATE** is based on a high-end wafer handling system, with robust design and a flexible architecture. The machine can achieve a testing speed above 3000 UPH (Units Per Hour), with an average measurement time of 1 second per sample. This is a key factor in shorten production time and reduce the testing cost per unit over the machine's lifetime

The **DOE** tester can be customized under specific requirements, improving the design flexibility. It is based on a high repeatability positioning table equipped with alignment tools and an automated visual inspection system that can fulfil the most demanding optical tests. Additionally, an automated tip/tilt correction of the chuck can fix, module by module, the wafer tilt and height variation due to process issues like wafer warpage. Lastly, a barcode/OCR reading system allows the traceability of each module of the wafer.

The ATE has a small footprint to be cleanroom-friendly, measuring 1350 mm (height) by 1330 mm (width) by 675 mm (depth). It is compliant with CE/UL safety standards and offers ISO 5 cleanroom compatibility.

Alfamation's **SuperNova** software solution, based on NI TestStand, allows an easy integration with a database for result storage and analysis, the management of test diversities and the test sequence development and customization.



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