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PRESS RELEASE
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Mirrorcle Technologies announces availability of 5.0mm diameter MEMS mirrors

Mirrorcle Technologies introduces larger diameter MEMS mirrors at Photonics West 2016. In addition to its integrated mirrors ranging from 0.8mm to 2.4mm, and the modular 'bonded' mirrors from 0.8mm to 4.2mm in diameter, the company now presents devices with 5.0mm diameter size. These mirrors are able to accommodate larger beams, opening opportunities for a number of new applications as well as enhancing the capability of existing applications. Mirrorcle's bonded MEMS mirror is a micro-assembly of a monolithically fabricated actuator 'engine' combined with a mirror, available in various sizes. For the new 5.0mm mirrors, larger MEMS actuators are recommendable because they offer more torque resulting in higher speed for a given mirror size compared to smaller actuator die. The outstanding performance of the first 5.0mm mirrors with A4SR8 actuators triggered executives' confidence to officially present this new size at the popular SPIE event in San Francisco.

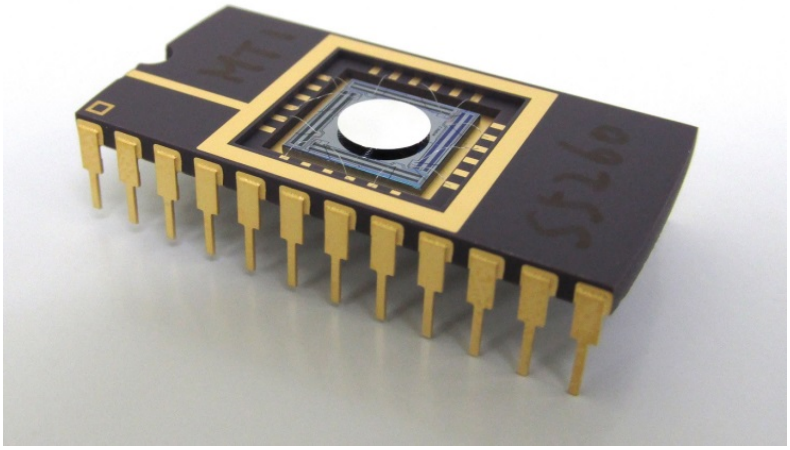

Figure 1. Mirrorcle's first-ever 5.0mm MEMS mirror with A4SR8.3 actuator chip in DIP24 package.This device offers an angular reach of 5 degrees at 500Hz fres.

New 5.0mm MEMS mirrors with stunning optical mirror quality

Mirrorcle engineers utilized a recently acquired 3D optical surface metrology system to assess the first batch of the new 5.0mm mirrors with respect to surface roughness and flatness. Traditionally, the company's mirrors come with a guaranteed flatness that exceeds 5 meters radius of curvature (ROC), for any mirror size, with residual deviation less than 50nm. This high optical quality is important in many applications in which beams need to be directed to predictable and repeatable angles while maintaining beam wavefront quality. Fabricated

from polished, pure single-crystal silicon wafers, MEMS mirrors are realized by deposition of a low-stress metal coating with an outstanding optical characteristics, high purity and smoothness. The first articles of the new 5.0mm diameter MEMS mirror measured at over stunning 100 meters ROC, with both the spherical and residual terms better than λ/20 and λ/40 for red and IR wavelengths, respectively.

5.0mm diameter MEMS mirror offers +/-5° mech. tip/tilt with a bandwidth of 500Hz

The very first 5.0mm diameter MEMS mirror was assembled onto an ‘A4SR8’ actuator, offering a true mechanical tip/tilt capability of +/-5.0° for both axes, so a total mechanical sweep of 10° which translates into an optical Field of View (FoV) of 20°. Speed measurements pointed at a bandwidth of ~500Hz in both axes. This combination of the 5mm size, +/-5.0° mechanical angle, and 500Hz bandwidth therefore successfully accomplishes the company’s design goal of the first ever “5-5-5” capability quasistatic MEMS mirror device. Like all of the company’s MEMS, these mirrors offer a 14-bit repeatability (precision) when driven with designated MEMS drivers, so 16384 discrete angular positions are repeatably addressable in point-to-point mode between the negative maximum to positive maximum angle in both axes. “We have truly come a long way since the sub-millimeter size mirrors from the early 2000s,” commented Dr. Milanovic, CEO and Founder of Mirrorcle Technologies. “Together with our manufacturing partners we have been able to push the total figure of merit for this MEMS technology well beyond what we anticipated was possible.”

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About Mirrorcle Technologies, Inc.

Mirrorcle Technologies, Inc. (MTI), founded in 2005, is a California corporation that commercially provides products and services based on its proprietary optical microelectromechanical system (MEMS) technology. Since its founding, and supported by its continuous investment in R&D, MTI has been offering the world's fastest point-to-point (quasi-static) two-axis beam-steering mirrors, as well as resonating-type micromirror devices with rates up to HD video display. MTI is globally the only provider of tip-tilt MEMS actuators in combination with mirrors from submillimeter to several mm in diameter, offering customers a wide selection of specifications to optimize their paths to successful commercialization. In addition to a variety of existing designs and in-stock products, MTI also contracts to create specialty designs and fabricate custom units as well as full system solutions.

MTI maintains a laboratory at its headquarters and has year-round, 24-7 access to wafer-based CMOS and MEMS fabrication facilities. MEMS mirror fabrication, wafer-level and die-level testing, packaging and outgoing inspections are all performed in clean-rooms. MTI has an established manufacturing service cooperation with a leading MEMS wafer foundry ensuring streamlined, high-quality volume production.

As a privately held company, MTI is able to act efficiently, offering creative and highly responsive service to customers. The company provides highest-quality products and support

to facilitate customers’ product development and successful commercialization. The team draws on several decades of combined experience in MEMS design, fabrication, and testing.