

NEWS RELEASE

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LEMOPTIX OPTICAL MEMS SCANNING MICROMIRRORS, THE SOLUTION OF CHOICE FOR HIGH-DEFINITION LASER PRINTER EQUIPMENT

Lemoptix silicon-based, magnetically actuated MEMS micromirror technologies are efficient and cost effective alternatives to conventional polygon mirror, LED array and external coil-magnet mirror assembly solutions, bringing leading-edge performance and space reduction to laser printers.

Responding to industry requests to significantly reduce size, power consumption and increased performance of micromirror devices, Lemoptix has replaced traditional galvanometer and rotating mirrors by micromirrors with actuation based on magnetic and heat-dissipating principles instead of gearings. These laser scanning micromirrors can be used in numerous optical applications such as 3D measurement, barcode scanners, endoscopy/confocal microscopy, optical spectrometers & medical imaging, scanners, printers, head-up displays, projectors etc....

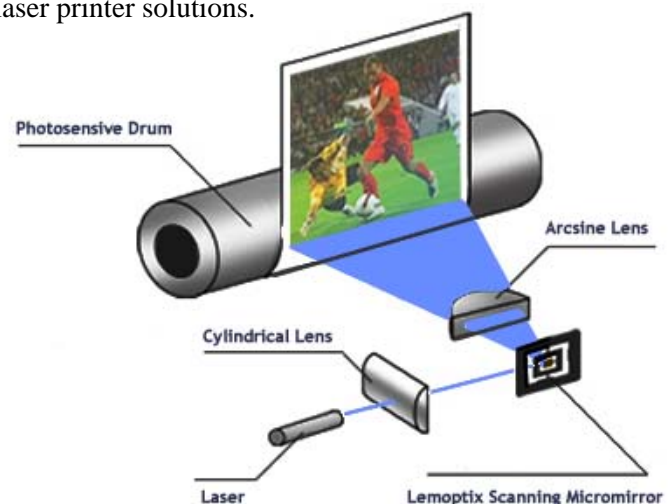
When incorporated into equipment like laser printers, they can potentially reduce the costs of manufacturing of these equipments while at the same time, improve their performance, increase the printed page throughput and shrink their footprint.

Lemoptix optical scanning mirrors provide a number of advantages. The devices can achieve high optical scanning rates, low power consumption, low voltage operation, greater durability and immunity to dynamic deformation during operation and precise/stable control of the mirror positioning thanks to integrated sensing control.

The scanner can operate at high scan frequencies, up to 70 kHz with a high-precision positioning, over a large angular range up to 100° optical angle, thus reducing image banding. This gives the device a scanning resolution far over thousands of pixels per scan line, making it possible developments of ultra-high resolution laser printer equipment. They operate at a very low operating voltage and current, thereby allowing it to consume less power than conventional laser printer solutions.

MEMS Mirror-Based Laser Printer Principle

A laser printer includes an exposure unit having a MEMS scanner operable to scan a beam of light across a photoconductor. The MEMS scanner includes a mirror having an aspect ratio similar to the shape of the facets of a conventional rotating polygon scanner. The MEMS mirror is operable to scan at a frequency of up to 70 KHz and an angular displacement of up to 100° scan angle.



Lemoptix, a Swiss based company, with a team loaded with expertise in development, microfabrication and industrialization of Micro-Electro-Mechanical System (MEMS) scanning micromirrors has taken MEMS scanning mirror technology to the next level. The company has developed a unique expertise in the areas of the mechanical and electrical design of MEMS scanning mirrors, magnetic actuation optimization and mirror optical properties. The result of this is a highly innovative product that features:

- Extremely large optical scanning angle above 40° in static (step by step, DC) mirrors
- Large optical scanning angle above 100° in resonant mirrors
- Integrated mirror position sensor, to sense the mirror position at any time (patented)
- Ultra-precise MEMS driving and sensing electronics
- Low voltage, below 5V
- Extremely low power consumption down to μW
- Large reflective surface of $> 2.5\text{mm} \times 2.5\text{mm}$
- High shock resistance
- No hysteresis behavior
- Insensitive to radiation

All of these features are essential requirements for industrial and consumer applications alike. Lemoptix micromirrors, made of single-crystal silicon demonstrate very high robustness and long-term stability. The surface reflectivity is enhanced by a thin coating of metal material. The highly flexible fabrication process means that a large variety of materials can be coated, thereby catering to light sources of different wavelengths.

Lemoptix MEMS scanning micromirror technology

With more than 10 years of development in the field of MEMS micromirrors, Lemoptix has a unique track record of several hundred different MEMS micromirrors designed and fabricated. The company has developed very efficient tools to achieve rapid prototyping of MEMS from the design to the fabrication. Average timing from the development of new MEMS, including design fabrication, assembly and testing is less than 3 months.

Lemoptix uses very advanced analytical and FEM (Finite Element Modeling) tools to do the complete MEMS design. The result is a product based on the following technology:

Magnetic actuation principle and characteristics

MEMS mirror actuation does not use gearing effects or any other mechanical contact-based effects. It uses an innovative fatigue-free magnetic actuation: an electric current flowing on the mirror itself, under a magnetic field, induces mechanical displacement, advantageously used for optical scanning.



*Chip on 3mm x 10mm standard PCB board
(including magnets)*



3 D Scanning System



MEMS Mirror Chip Actual Size

Resonant actuation: Specifically designed MEMS mirrors to be actuated at their mechanical resonant frequency. The maximum intrinsic silicon material gain is used to obtain the widest possible scanning angle at an ultra-low power consumption level.

Static actuation: Specifically designed MEMS mirrors to be actuated in static operation, meaning that the mirror is tilted and the position is held stable. It is here that the expertise of Lemoptix really comes to the fore by achieving a best in class optical scanning angle of more than 40° coupled with remarkably low power consumption and input voltage. With a scanning angle being highly linear to the applied signal level.

Building blocks for future vision

With the core technology of the MEMS Mirrors as a base and using the same expertise that created them, Lemoptix has developed key IP and expertise in design and manufacture of microprojectors that will ultimately fit inside a mobile phone bringing a new dimension to how users experience mobile phones and other mobile internet devices. Other applications include Head Up Displays in cars, Helmet/Head mounted displays, Retail displays etc.

The projector includes:

- Complete projection optical module integrating MEMS mirror, laser light sources and optical components
 - Complete analog and digital electronics to drive and sense in closed-loop operation the MEMS mirror
 - Standard video interface to easily connect the microprojector in embedded or external devices
- Lemoptix microprojector is a plug-and-play solution for demanding applications that require high brightness, low power consumption and ultra-miniaturization.

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<http://www.mericttech.com/micromirrors.htm>