MEMS MIRROR VARIATION IN MANUFACTURING

Last Revised: Oct. 2020
MEMS1 is a MEMS with greater torsional stiffness relative to other MEMS from the wafer.
- It has a much higher resonant frequency, but a much lower mechanical angle.

MEMS2 is a MEMS with average torsional stiffness relative to other MEMS from the wafer.
- It has an average resonant frequency and an average angle.

MEMS3 is a MEMS with lowest torsional stiffness relative to other MEMS from the wafer.
- It has the lowest resonant frequency and higher mechanical angle.
Sample Edge Datasheets

Lowest angle / Fastest Device Example

Highest angle / Slowest Device Example

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Explanation of Main Source of Variation

- Wafer thickness may vary within each wafer and wafer to wafer. This has a minor effect on Angle and Frequency as it is relatively tightly controlled in the process.

- Etching of silicon within different wafer areas and from wafer to wafer varies due to the nature of the process, equipment, temperatures, etc. The result is that silicon beams which suspend the device vary in width. There may also be thickness differences in etched areas.

- Torsional stiffness of mechanical beams is proportional to $Width^3 \cdot \frac{Height}{Length}$ so it is extremely sensitive to beam width variance.

- Angle at a given voltage is inverse proportional to torsional stiffness.

- Frequency is proportional to $\sqrt{K/I}$ and thus proportional to square root of torsional stiffness.

- Very roughly, ±5% variation in Width is ±15% variation in angle, is ±7.5% variation in frequency.
Thank You for Choosing

Additional Resources:

- Mirrorcle MEMS Mirrors – Technical Overview
- Mirrorcle Documentation Portal
- Mirrorcle Web Page – Support
- Mirrorcle Web Page – Application Notes
- Mirrorcle Web Page – Publications

If you have any further questions or suggestions please email us:
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